# American Foundryman

august 1952

THE FOUNDRYMEN'S OWN MAGAZINE



# THE WORLD MELTS WITH *Lectromelt**...

## 35 Countries...1,056 Lectromelt Furnaces...2,480,000 KVA

**LECTROMELT FURNACES THE WORLD OVER**

| Country | No. of Furnaces | Country | No. of Furnaces |
|---|---|---|---|
| AFRICA | 28 | MEXICO | 20 |
| ARGENTINA | 2 | NEW CALEDONIA | 2 |
| AUSTRALIA | 12 | NEW ZEALAND | 4 |
| BELGIUM | 2 | NORWAY | 2 |
| BOLIVIA | 2 | PANAMA CANAL | 2 |
| BRAZIL | 30 | REP. OF PANAMA | 1 |
| CANADA | 50 | PERU | 4 |
| CHILE | 11 | PHILIPPINE ISLANDS | 3 |
| CHINA | 17 | POLAND | 3 |
| COLOMBIA | 7 | PORTUGAL | 4 |
| DENMARK | 2 | RUSSIA | 69 |
| ENGLAND (BR. ISLES) | 70 | SPAIN | 26 |
| FINLAND | 4 | SWEDEN | 8 |
| FRANCE | 4 | TURKEY | 2 |
| HAWAII | 1 | UNITED STATES | 635 |
| ITALY | 16 | URUGUAY | 1 |
| INDIA | 9 | VENEZUELA | 1 |
| JAPAN | 2 | | |

**Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S.A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.**

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

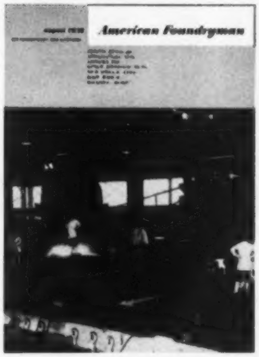
WHEN YOU MELT... *Lectromelt*

# American Foundryman

**August 1952** / *Volume 22 · Number 2*

***Official Publication of the American Foundrymen's Society***





The Big Pour—303,000 lb of steel into a single mold in 14½ min—occurred at Continental Foundry & Machine Co., East Chicago, Ind. Molding the 300,000 lb anvil took two weeks, drying 48 hr. Special safety precautions for pouring included new asbestos coats and leggings, hard hats, safety shoes, and goggles for the workmen, prearranged escape routes in case of serious trouble, and double crews in the three cranes used. New cables were installed in the cranes, hooks were double-tested. Three open hearths melted the steel poured early that morning. In the afternoon the riser was touched up with 25,000 lb of steel and a three-electrode hot top was used to keep the riser molten. The casting cooled in the sand for 60 days.



**Published monthly by the American Foundrymen's Society, Inc., 616 S. Michigan Ave., Chicago 5. Subscription price in the U.S., Canada and Mexico $3.00 per year; elsewhere, $6.00. Single copies 50c. Entered as Second Class Matter, July 22, 1938, under Act of March 3, 1879, at the Post Office, Chicago.**

**MORE THAN 4500 FOUNDRIES ARE USING STERLING STEEL FLASKS!**

**Backed by Almost a Half Century of "KNOW HOW" in Fabricating Precision Built Foundry Flasks**

Interior of large Eastern steel foundry. Note battery of Sterling Style "LDT" Flasks with double pin lugs, cast steel trunnions and tubular steel handles.

High-speed sand slinger molding leaves no soft spot under the patented Sterling sand flange. Fillets eliminate sand "pockets" at top and bottom of both cope and drag.

# Cut Costs

## with STERLING ROLLED STEEL FOUNDRY FLASKS

You naturally want your castings to meet the highest standards of workmanship. That's a "must"! But, at the same time, you want to reduce production costs as low as possible. You can do *both* by using Sterling Rolled Steel Channel Flasks.

Foundries have learned from experience that Sterlings save on labor, sand and castings. The sturdy, compact Sterling Flasks have the practical combination of maximum strength with minimum weight. They simplify ramming, are easy to shake out.

Our representative will gladly show you how Sterling Flasks can effect economies in your foundry. Write today.

**THE STERLING LINE:** standard flasks . . . heavy duty flasks . . . stack molding flasks . . . flask pins . . . hardened steel bushings . . . stub pins . . . collar bushings . . . malleable clamps . . . steel bottom boards . . . steel core plates . . . squeeze-in boards . . . steel bands . . . steel upsets . . . wheelbarrows . . . core trucks . . . casting trucks . . . slag buggies . . . casting carts . . . steel wheels . . . casters.

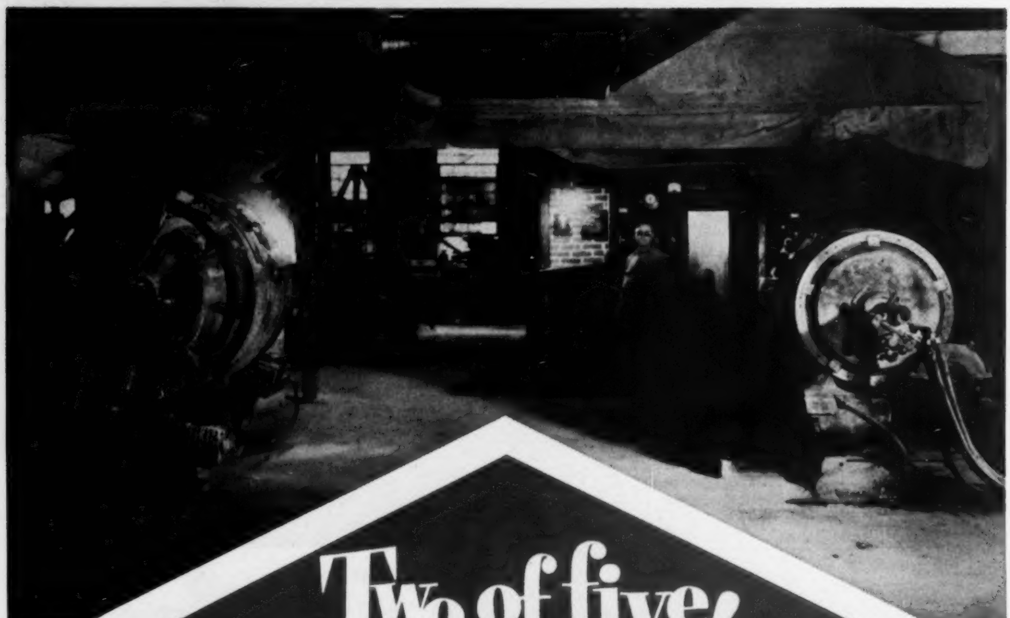
**STERLING WHEELBARROW COMPANY**
MILWAUKEE
WISCONSIN, U. S. A.

43 YEARS At Your Service! 1909 1952

**Sterling**

**Pioneers in the Manufacture of Foundry Flasks**

A 7143-1PC



# Two of five!

1 350 lb. furnace installed 1925
1 350 lb. furnace installed 1925
1 350 lb. furnace installed 1937
1 700 lb. furnace installed 1941
1 700 lb. furnace installed 1942

*average age 17 years*

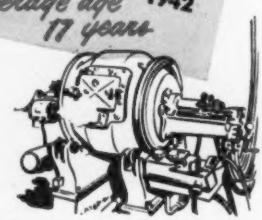
## Detroit ROCKING Electric Furnaces build long service record—melting bronze for the Jeffrey Company foundry

At The Jeffrey Manufacturing Company, Columbus, five Detroit Electric Furnaces have made excellent records melting bronze for worm wheels, bearings, bushings, electrical contacts, and pressure-type castings. In hundreds of other foundries, Detroit Furnaces are doing equally outstanding jobs melting bronze, iron, and steel alloys.

Detroit Rocking Electric Furnaces turn out fast melts of uniform high quality metal. Close control of analysis produces metal of desired analysis time after time, with optimum use of power. The melts are homogeneous, thoroughly mixed by the rocking action of the furnace. Electrodes are free of the molten metal at all times, reducing carbon pick-up to an absolute minimum.

Long life of Detroit Electric Furnaces is documented by such installations as that shown. Economies are proven, too—accomplished by full use of power, less heat loss, reduced metal shrinkage, more heats per day, less metal waste per melt, and reduced out-of-production time because of longer refractory wear and easy shell replacement.

Detroit Rocking Electric Furnaces are tailored to your operating needs. Capacities from 10 to 4000 pounds, for ferrous and non-ferrous melting.



**Better melts, faster melts—rocking action does it! Get the facts on what Detroit Rocking Electric Furnaces can do for you! Send us your data now!**

**DETROIT ELECTRIC FURNACE DIVISION**

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo, CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y., MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico, EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

FEMA

# "THIS IS WHAT HAPPENS TO GOOD LITTLE PIGS!"

PRINCESS WENATCHEE: You mean *Electro-Silvery* pigs!

CHIEF KEOKUK: Yes indeed! Those good little pigs end up helping to make important products like this farm tractor . . .

PRINCESS WENATCHEE: . . . and countless other products like tanks and automobiles . . .

CHIEF KEOKUK JR: Hey, Pop—what *is* Electro-Silvery?

CHIEF KEOKUK: Electro-Silvery, son, is a form of ferro-silicon that acts as a vital control element in the production of iron and steel . . .

PRINCESS WENATCHEE: . . . and the largest producer in the world of this vital ingredient is Keokuk Electro-Metals Company .

Keokuk Electro-Silvery is used by foundries and steel plants in the form of these three pigs, weighing 60 pounds . . . 30 pounds . . . and 12½ pounds.

# KEOKUK

**ELECTRO-METALS COMPANY**

KEOKUK, IOWA

WENATCHEE DIVISION: WENATCHEE, WASHINGTON

**SALES AGENTS: MILLER AND COMPANY**

332 S. Michigan Ave., Chicago 4, Illinois

3504 Carew Tower, Cincinnati 2, Ohio

915 Olive St., St. Louis 1, Missouri

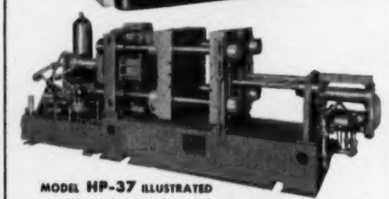
# KUX

## FIRST NAME IN DIE CASTING MACHINES

—helps make

**Maytag**

**first name in washers**



MODEL **HP-37** ILLUSTRATED

Hydraulically operated die casting machine for production of aluminum castings.

Battery of KUX Die Casting Machines in operation in the ultra-modern Maytag factory at Newton, Iowa

**Since 1907,** over 6 million Maytag Washers have been sold—far more than any other. The reason's clear; Maytag makes a wonderful washing machine . . . plus a full line of other home laundry equipment and famous Dutch Oven Ranges. It's logical that KUX, first name in die casting machines, should be used in the quality production of these superior products.

The use of KUX die casting equipment can put YOUR PRODUCT ahead—or keep it ahead. Reduce your manufacturing costs—increase the saleability of your product, with quality die castings made on these rugged machines.

***Write for illustrated catalog showing complete line of KUX Die Casting Machines***

**KUX MACHINE COMPANY**
**6725 N. Ridge • Chicago 26, Illinois**

# KUX

**FIRST NAME IN DIE CASTING MACHINES**
**SELECTED BY FIRST NAMES IN INDUSTRY**

# Take the molder's advice--he Knows!

THE REPORTS OF MOLDERS AND SUPERINTENDENTS IN MANY LEADING FOUNDRIES IN UNITED STATES AND CANADA, PROVE THAT FAMOUS CORNELL CUPOLA FLUX MINIMIZES THE CASTING SCRAP PILE.

## Famous CORNELL CUPOLA FLUX

CLEANSES AND GREATLY DESULPHURIZES MOLTEN IRON AND MAKES IT MORE FLUID.

It is an outstanding contribution to sounder, cleaner, tougher castings, and greatly facilitates machining operations.

THE CUPOLA OPERATOR, TOO, HAS GOOD NEWS FOR YOU. Famous Cornell Cupola Flux keeps cupolas cleaner, drops are cleaner, bridging over is practically eliminated, and there is less erosion of brick or stone due to the formation of a glazed or vitrified surface on cupola lining. *This means greatly reduced down time and labor for maintenance.*

THE SCORED BRICK FORM not only makes fluxing of molten iron a matter of seconds, but enables you to use the correct amount for each charge of iron.

SCORED BRICK FORM
(Approx. 4 pound brick)

WRITE FOR BULLETIN No. 46-B

**The Cleveland Flux Co.**

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

*Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918*

FAMOUS CORNELL FLUXES
Trade Mark Registered

**BRASS FLUX**

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

**ALUMINUM FLUX**

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

## WOULD YOU BELIEVE IT? *THIS* SHOT IS ANNEALED PRACTICALLY *One Pellet at a Time!*

Permabrasive annealed shot and grit is NOT annealed in batches—but is heat treated in unique fashion by a continuous process—practically heat treating a pellet at a time. Here is what this means to you:

Long abrasive life and low maintenance costs associated with the use of annealed abrasives often make this type of abrasive the most economical. Now—by a newly developed process of CONTROL—it is possible to produce annealed shot in three different and distinct hardness ranges with a narrow hardness range in each. This means that you can now buy an annealed shot in the exact hardness range to suit YOU—permits the selection of a hardness range that gives you the desired rate and degree of cleaning plus the lowest possible maintenance cost commensurate with the required degree of cleaning: by "fitting" your annealed shot to the job—you can save even more money.

Makes sense, doesn't it? And all we ask is to be permitted to determine what your exact hardness requirements are. This doesn't cost you anything—but if we're right—can save you a tidy sum of money.

Please write your name and address on the coupon below and mail it to the Hickman, Williams office nearest you. No obligation, of course. The most you can lose is a three-cent stamp.

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MAIL TO HICKMAN, WILLIAMS OFFICE NEAREST YOU

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# "We'll never have to weigh another alloy charge for the cupola"

**It's easier for everybody when counting eliminates trips to the scale.**

## OHIO FERRO-ALLOYS BRIQUETS

Reduce your labor cost . . . Make it easy for the man at the cupola charging door to make exactly the right additions. Ohio Ferro-Alloys briquets provide excellent insurance against error in charging.

### OHIO FERRO-ALLOYS PRODUCTS

FERRO-SILICON - 50 - 65 - 75 - 85 - 90% LOW CARBON FERRO-CHROME SILICON • SPECIAL BLOCKING 50% FERRO-SILICON • FERRO-MANGANESE • HIGH CARBON FERRO-CHROME • BOROSIL • SIMANAL

**BRIQUETS**

SILICON • MANGANESE • SILICO - MANGANESE • CHROME

PHILO — DEPENDABILITY — QUALITY • SERVICE
TACOMA — DEPENDABILITY — QUALITY • SERVICE
BRILLIANT — DEPENDABILITY — QUALITY • SERVICE

*Ohio Ferro-Alloys Corporation*
*Canton, Ohio*

Chicago Detroit Pittsburgh Tacoma Seattle
Minneapolis Birmingham San Francisco Los Angeles

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SAN FRANCISCO AREA—Pacific Graphite Company, Inc., Oakland 8, California.
LOS ANGELES AREA—Snyder Foundry Supply Company, Los Angeles 11, California.
MINNEAPOLIS AREA—Foundry Supply Company, Minneapolis, Minnesota.
DENVER, COLORADO—Metal Goods Corporation.
MEXICO—CIA. Proveedora de Industrias, S. A. Mexico, 6, D. F., Mexico.

**SALES AGENTS, NO WAREHOUSES:**
NORTHWEST AREA—E. A. Wilcox Company, Arctic Building, Seattle 4, Washington; Phone Mutual 1468.

BIRMINGHAM DISTRICT—Schuler Equipment Company, First National Building, Birmingham, Alabama.

# simplicity 3′ x 8′ ring-type crusher recovers about 400 tons of sand per day

Through the use of just *one* Simplicity 3′ x 8′ Ring-Type Crusher, a leading automobile manufacturer realizes savings of about 400 tons of sand daily in grey-iron foundry operations. In this installation, lumps of sand, especially those from cores that do not break up in shakeouts or screening, are fed to the Simplicity Crushing Screen instead of being hauled to the dump, as is the practice in many foundries. The recovered sand is returned by conveyor to sand storage and mulling equipment thus making appreciable savings in new sand requirements as well as eliminating the cost of hauling away sand lumps. With a Simplicity, one unit does both crushing and screening. It gives positive crushing action and maximum production of grain-size sand. Simplicity Crushers are available with either one, two, or three sets of rings, depending on the lump size to be crushed.

Simplicity Crushing Screens are in profitable operation today in foundries producing magnesium, aluminum, steel, malleable iron, and grey iron castings . . . why not put one to work in your foundry?

A Simplicity sales engineer will be glad to give you the full story. Write us.

103

**Sales representatives in all parts of the U. S. A.**

**FOR CANADA:** Canadian Bridge Engineering Company, Ltd., Walkerville, Ontario

**FOR EXPORT:** Brown and Sites, 50 Church Street, New York 7, N. Y.

**Simplicity**

TRADE MARK REGISTERED

**ENGINEERING CO. • DURAND, MICHIGAN**

# products and processes

For additional information,

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### 801 Investment

Producing a hard, smooth surface, Royaloy Investment uses a water binder instead of an organic binder. Its setting time can be regulated, and needs no tamping. *Royaloy, Inc.*

### 802 Flask cleaner

Special washing machine designed especially for removing sand mechanically from steel flasks removes sand quickly and completely. Machine uses a spray of cleaning solution. Flasks pass along on a bar conveyor through consecutive fan-shaped curtains of solution directed from above, below, and both sides. Special feature is a settling tank that removes foreign particles from the recirculating solution to prevent clogging of the spray nozzles. *Alvey-Ferguson Co.*

### 803 For loading metal

Fully automatic metal loader eliminates all the heavy hand loading and obnoxious fumes common to the usual manual operation. It is adaptable for any make of melting pot. A detachable cart raises the load of metal, dumps it, and returns to loading position. *C. M. Kemp Mfg. Co.*

### 804 Cement gun

Designed to handle a wide variety of materials including cement, sand, light aggregates, refractories, gravels, and other sandy or granular or powdery materials, the Blastcrete Machine throws them up with a minimum of air. Operator has full control of air pressure and material volume, as all adjustments can be made while the machine is in operation. Practically all moving parts have been eliminated, with the exception of the motor and gear reducer; these units require periodical lubrication. Machine is available in 3 sizes. *Blastcrete Equipment Co.*

### 805 Stock checker's truck

Featuring a frame-welded writing table and stationery rack, all-steel stock checker's truck has three shelves with all-around 1-in. flange to prevent materials from falling off. Tubular steel handle forms protective bumper for stationery rack. Dimensions: 9½-in. floor clearance; over-all height to top shelf, 42½-in.; height between lower and center shelves, 20 in.; between center and top shelves, 12 in.; height to top of writing table 50 in.; length, 44 in.; width, 29 in. Unit is equipped with 6-in. rubber-tired roller-bearing casters. *Palmer-Shile Company.*

### 806 "Pulse" core blower

Debuted at the recent Foundry Convention, the San-Blo core blowing machine can blow cores in unvented, unrigged core boxes. Conventional machines develop so much air pressure that ordinary wooden boxes are blown apart, but the San-Blo can be used with the same boxes used by bench core makers in their hand operations. Ability is the result of using a series of short, quick blasts rather than one continuous one. Air pressure is thus easily controlled and kept extremely low. Machine also features a mechanized sand magazine with motor-driven plows and an "aerating" air circuit to move sand to the blow hole. This permits the use of any core sand mix that can be hand-rammed, with moisture to 8 per cent and green bond strength to 12 psi. *Federal Foundry Supply Co.*

### 807 Bi-metallic bonds

Al-Fin is a patented casting process for the molecular bonding of aluminum and its alloys to steel, iron, and other metals. It permits the production of bi-metallic units combining selected physical properties of both metals. Pure aluminum or any of its casting alloys can be bonded to ferrous metals, nickel, or titanium. The process essentially of casting light metal in the usual manner against a specially prepared surface of the ferrous metal. All of the standard casting methods —sand, permanent mold, plaster mold, and pressure die casting—can be used. Only one extra step and no special equipment or material is needed beyond that of a well-equipped aluminum foundry. The minor cost increase is often offset by the fact that keyed, serrated, or knurled ferrous inserts are not needed to obtain an inseparable joint. *Al-Fin Div., Fairchild Engine & Airplane Corp.*

### 808 Car unloader

Rajon car unloader comes in two styles for removing sand, slack coal, limestone, and similar materials from gondolas or box cars. Lightly built of aircraft steel, the units are easily rolled by hand during use and swung from car to car or to loading dock by light boom. Both unloaders use buckets on a continuous chain to pick up, elevate, and dump material onto a conveyor belt which carries ma-

*continued on page 88*

Reader Service Dept.

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**Please send me detailed information on the Products and Processes and Free Foundry Information circled.**

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| 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 |
| 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 |
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AMERICAN FOUNDRYMAN

616 S. Michigan Avenue

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# free | foundry information

**For additional information**

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### 813 Casting service

"Microcast Parts", a 16-page brochure, tells the complete story of a precision investment process for mass-producing castings from a fraction of an ounce to one pound. Length is limited to about 8 inches, depending on shape and contour. Tolerances are remarkably small, and no machining is required. Process works with almost any alloy. Offer includes not only manufacture but design and metallurgical advice. *Microcast Div., Austenal Laboratories, Inc.*

### 814 Mechanization

How a foundry can be mechanized for increased production, better castings, and improved working conditions is the topic of Book 2439, totalling 36 pages. This is a selection of case histories, foundry layout drawings, and installation photographs. Foundries handling gray iron, malleable iron, steel, brass, aluminum, and magnesium are among those represented. *Link-Belt Co.*

### 815 Ceramics

Bulletin 522 contains 4 pages of foundry ceramics designed to withstand heat shock—cut-off cores, troughs, strainer cores, and gate tubes. Some illustrations are also contained. *American Lava Corp.*

### 816 Core blower

Bulletin P-1 gives facts about a core blower that fills core boxes in 3 or 4 short blasts instead of one long blast. Advantage is that air pressure can leak out of the core box during blowing; this eliminates the need for vent holes or special rigging. Both wood and metal boxes can be filled with equal ease and success. *Federal Foundry Supply Co.*

### 817 Dust filter

Bulletin 101 presents illustrations and specifications on the Dynaclone, a cloth bag filter for collecting industrial dusts. Principal features of the unit are uniformly maintained suction, and removal of dust from filter bags by reversing the air flow. *W. W. Sly Mfg. Co.*

### 818 Diamond abrasives

Four-page folder "Specimen Polishing with Diamond Compound" describes the advantages of diamond abrasives for polishing metallurgical specimens. Abrasive is offered in 3 different particle sizes, all in 5 and 18-gram gun applicators. *Buehler Ltd.*

### 819 Shell molding resins

Eight-page, 2-color bulletin CDC-222 does a nice job of covering shell molding history, advantages, equipment, and materials. Center spread gives the 8 consecutive steps.

### 820 Belt grinder converter

Conversion attachments for turning any grinding machine into a belt grinder are detailed in 4-page Bulletin S-13. Attachments are available in 2 sizes, one for 15,000 rpm tools and the other for 9000 rpm tools. Each consists of a contact wheel, supporting arm mechanism, and an idler pulley which supports and aligns the abrasive belt. *Buckeye Tools Corp.*

### 821 Instrument accessories

Bulletin TC-9 is the 1952 edition of the Wheelco Data Book and Catalog containing prices, application recommendations, and data concerning instrument sensing units and associated accessories. It contains information on making, checking, selecting, and ordering thermocouples, radiation detectors, and resistance bulbs; data on wire sizes and resistances; temperature-millivolt curves; and a great deal of essential engineering data, all in 42 pages. *Wheelco Instruments Div., Barber-Colman Co.*

### 822 Bench core blower

The Champion CB-5 core blower produces cores up to 4½ lb, takes no more room than one bench worker, and does the work of several. Described as the lowest cost complete unit on the market, the unit includes the following exclusive features: blow plates held in position by permanent magnets, require no screws or nuts; removable clamp unit for blowing vertically-split boxes; single valve operation; built in air reservoir; swing-type, easily-loaded sand magazine; easily adjusted box alignment stops; adjustable sand magazine height; delivered fully equipped, no extras required. The CB-5 heads a line of large, medium, and small core blowers all described in Bulletin No. 5000. *Beardsley & Piper, Div. of Pettibone Mulliken Corp.*

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| 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 |

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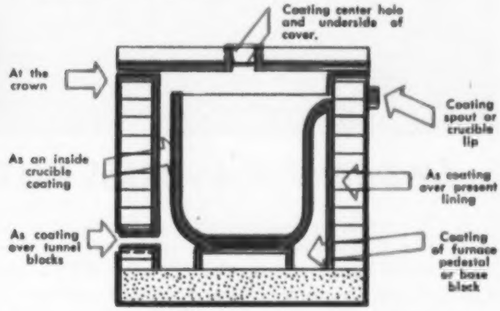
# Here's the LIFESAVER for your FURNACES, CRUCIBLES...

***...and this is the Coating Method that will increase your non-ferrous metals melting production...***

**HY-TEMP**
**PLASTI-BOND**
**HIGH TEMPERATURE CEMENT**
**REFRACTO**

APPLY HTR PLASTI-BOND COATING TO THESE POINTS ON FURNACE AND CRUCIBLE




This HY-TEMP REFRACTO quick setting cement, PLASTI-BOND, offers you the refractory plus-factors that transform "down-time" hours into pounds of metal melted.

As a coating on the furnace crown, PLASTI-BOND prevents "chewing out" of lining through fusion of furnace cover and crown—as pedestal coating it prevents adherence of crucible to stool—its unusual high temperature resistance prevents heat deterioration of tunnel blocks—its quick-hardening characteristics and stamina resist abrasive wear in furnace and crucible spouts. In all non-ferrous metal-handling equipment, this HTR air setting cement protects lay-up brick and joint material by sealing such residual linings and preventing porosity, gas holes or pin holes.

Resistant to slag and other harmful oxides that adhere to ordinary linings, PLASTI-BOND protects metals in heat from contamination and analysis breakdown. Broad field experience has proven that this HTR super-refractory, plastic in substance, will prolong the heat-life of the furnace and INCREASE CRUCIBLE-LIFE 50% TO 100%!

*Write today for the HTR PLASTI-BOND Application Bulletin . . . yours free of charge. Present your non-ferrous metals melting problems to HTR Service Engineers. A complete, competent analysis of your case will be furnished without obligation to you.*

**SPECIFY HTR FOR BEST RESULTS**

HY-TEMP HTR REFRACTO MATERIALS

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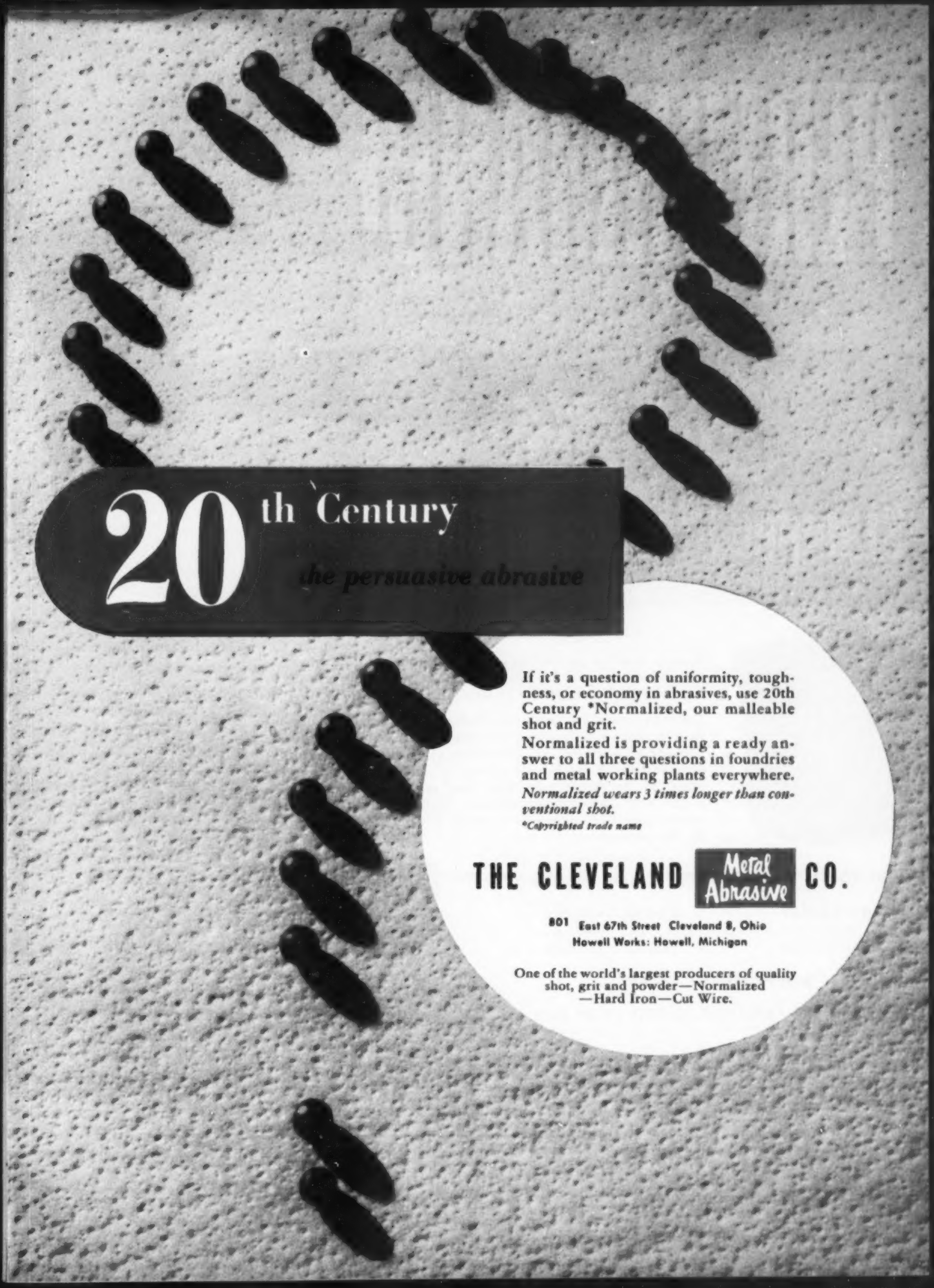
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# Foundry men in the news

J. A. Wickett

**J. Allan Wickett** has been named chief metallurgist at the Brillion Iron Works Inc., Brillion, Wis. Mr. Wickett is a native of Toronto, Canada, and since his graduation from the University of Toronto in 1939 has been associated with Canadian and American foundries. Previous affiliations include Monsanto Chemical Co., Springfield, Mass.; Aluminum Co. of Canada Ltd., Quebec; Interlake Chemical Corp., Cleveland; and Steel Co. of Canada, Ltd.

**George V. Slottman** was recently elected a vice-president of Air Reduction Co., Inc., New York. He has been the firm's director of research and engineering since February 1949 and will continue in that capacity. He has been closely associated with the development of steel-making processes using oxygen for both combustion and as a chemical reagent.

**Robert E. Etherton** has been appointed Chicago district manager of the Peninsular Grinding Wheel Sales Corp., Detroit.

**Horace S. Johnston** is the new treasurer of United States Radiator Corp., Detroit. He joined U.S. Radiator in 1948, having wide experience in banking and credit both here and abroad.

**H. O. Bennett** has been appointed sales representative by Michigan Oven Co., Detroit. His territory will cover Indianapolis and parts of Ohio and Kentucky. **Bruce Hogarth** will serve in a similar capacity around Philadelphia.

**Richard Herold** wrote *"Current status of shell molding"* which starts on page 42 of this issue. After graduating from Yale in 1936, he was employed in sales of industrial gases and welding equipment until the Naval Air Force tapped him in 1941. Fall of 1946 found him a civilian again, at which time he joined Borden Co., New York, to sell synthetic resin core binders and allied products. In 1949 he was made manager of Borden's Foundry Products Dept., Chemical Div., the job he holds today.

Richard Herold

**George W. Edwards** and **Charles R. Heilig** have been named service manager of the Special Service Div. and senior sales engineer of the central district, respectively, for Basic Refractories Inc., Cleveland. Edwards has been with Basic since 1947; previous affiliations include 14 years with Republic Steel. Heilig joined Basic in 1944, with 25 years' experience in steel production as chemist, melter, furnace operator, and open-hearth superintendent.

**H. W. Bleuthe,** former advertising manager of Wheelco Instruments Co., Chicago, has joined the Lindberg Engineering Co., also of Chicago, as sales promotion manager. He will be in charge of publicity, public relations, and sales analysis.

**Charles C. Reiff** assumes the duties of chief engineer, Rockwell Mfg. Co., Barberton Div., Barberton, Ohio. Succeeding him as project engineer of Rockwell's Lubrication Dept., Pittsburgh, is **Bernard Last.** Mr. Reiff joined Rockwell in 1950, after experience with Heintz Mfg. Co. and the Franklin Institute Laboratories for Research & Development, Philadelphia. Mr. Last joined Rockwell at the same time, having been affiliated with Mack Trucks, Breeze Corp., Inc., and the M. W. Kellogg Co.

**H. M. Oshry** has been named vice-president and director of Crawfordsville Foundry Co., Crawfordsville, Ind.

**Sir William Griffiths,** DSc, of London, England, will serve as consultant for Lebanon Steel Foundry, Lebanon, Pa. Sir William was until recently chairman and managing director of the Mond Nickel Co., England, as well as vice-

Ralph W. Stocking, standing at left, receives the congratulations of Fritz Schnackenberg on his appointment as plant manager of the Beardsley & Piper Div. of Pettibone Mulliken Corp., Chicago. Mr. Schnackenberg, whom Mr. Stocking replaces, is leaving the firm to take a position with the Nordberg Corp. of Milwaukee. Seated at Mr. Schnackenberg's left is E. J. Seifert, company president, while C. V. Nass, vice-president and general manager is at right.

chairman and director of International Nickel Co. of Canada.

**Eugene S. Page** has been named special assistant to **Arnold K. Brown,** executive vice-president of American Machine & Foundry Co., New York.

**Ransom Cooper Jr.** has been appointed manager of the Nickel Sales Dept. while **H. D. Tietz** takes over as manager of the Nickel Alloys Dept. of International Nickel Co., Inc., New York.

**J. H. Baldrey,** superintendent of melting for Allegheny Ludlum Steel Co., Watervliet, N.Y., was elected president of Electric Metal Makers Guild, Inc., at the annual June meeting. **C. H. Wyman,** superintendent of melting for Burnside Steel Co., Chicago, was elected vice-president, while **C. B. Williams,** melting superintendent for Massillon Steel Casting Co., Massillon, Ohio, was reelected secretary-treasurer.

**W. E. Jones,** former chief engineer of Stockham Valves & Fittings, Inc., Birmingham, has been named general manager of Wedgeplug Valve Co., Inc., recently purchased by Stockham. Wedgeplug is located in New Orleans.

**Lewis Koch**

**Lewis Koch,** superintendent of melting operations at Ohio Malleable Iron Co., Columbus, Ohio, wrote the double auger tuyere article on pages 36-38 of this issue. Mr. Koch started work as a millwright in 1934 for Carnegie Illinois Steel Co., Gary, Ind.; moved to Ohio Steel Foundry in Lima, Ohio, in the same position; moved to Albion Malleable Iron Co., Albion, Mich., in 1943 to take up the job of melter; and finally settled at his present location in 1950.

**S. C. Rothmann**

**S. C. Rothmann,** Industrial Hygiene Director for Deere & Co., Moline, Ill., is the author of *"The industrial hygiene engineer"* on pages 56-60 of this month's issue. A native of Charleston, West Virginia, Mr. Rothmann graduated from the University of Pittsburgh and Harvard Graduate School of Public Health. He has 20 years' training and experience in the field of loss prevention engineering. Prior to his affiliation with Deere & Co., he was connected with the Association of Casualty & Surety Companies as research engineer. His work has covered a wide variety of occupational disease and accident prevention problems in numerous industrial and governmental operations, including the West Virginia Workmen's Compensation Commission, West Virginia State Health Dept., Pullman-Standard Car Mfg. Co., National Battery Co., and the Ruberoid Co.

**V. F. Stine**

**Victor F. Stine,** who authored *"How to select abrasives for blast cleaning metals"* which appears on pages 39 to 41, has spent 40 years in the blast cleaning business, all of them with Pangborn Corp., Hagerstown, Md., where he is vice-president in charge of sales and engineering. He started as an accountant and progressed through the positions of auditor, assistant treasurer, assistant secretary, secretary, second vice-president, and vice-president. Mr. Stine has been a member of A.F.S. for 25 years and is a past director of the Chesapeake Chapter. He is a director of Foundry Equipment Manufacturers' Association.

**C. L. Adovasio**

**Carmen L. Adovasio,** former metallurgical engineer with Ohio Brass Co., Mansfield, is now associated with Cia. Industrial Del Norte, S. A., Saltillo, Coahuila, Mexico. His duties are those of production and technical advisor of the castings division; he is also a director of the company. Mr. Adovasio was with Ohio Brass for 11½ years.

**J. D. Swain** and **E. H. Mangan** have been appointed executive vice-presidents of Electro Metallurgical Co., a Division of Union Carbide & Carbon Corp., New York. Both have been with UC&C for many years, Swain in sales, Mangan in engineering, power, and production.

**William L. Hartley,** former sales manager at Link-Belt's Philadelphia plant, has been transferred to executive sales headquarters in Chicago to specialize in the application of long-haulage belt conveyors and other major engineering projects. Mr. Hartley has been with Link-Belt for 15 years in various sales capacities. He is a member of A.F.S.

**Roy W. Bennett,** formerly with Hydro-Blast Corp., Chicago, is in charge of the foundry materials division of Walter Gerlinger, Inc., Milwaukee. Since starting his foundry career in 1933 with American Steel Foundries, he has been with Harry W. Dietert Co., Detroit, and Metro-Nite Co., Milwaukee.

## ▶ *Obituaries*

**Harold H. Townes,** 60, died Monday, April 28 at his home in Portland, Ore. He had retired January 1 from his position as manager of Federated Metals Div. of American Smelting & Refining Co. He was a native of Aldrich, Mo., and had lived in Portland for 41 years.

**James H. Bernard,** resident manager of the Foundry Div. of Eaton Mfg. Co., Vassar, Mich., was stricken at the plant office on May 9 and died shortly after. His service with Eaton started in 1932, when the Erb-Joyce Foundry Co. (by which he was then employed) became a part of the Eaton organization.

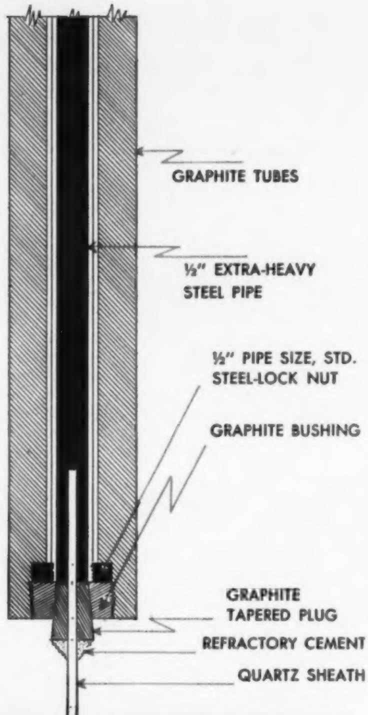
**Herbert A. Newbury** died at his home in Talledaga, Ala., on April 29. He had been in retirement since 1947. Born in 1876 at Coxsackie, N.Y., Mr. Newbury started his association with the foundry

*continued on page 92*

# *In Furnace and Foundry...*

## These SMALL PARTS do a BIG JOB

● High temperature applications of "National" Carbon and Graphite are not limited to big-tonnage items. A part of National Carbon's service is to develop *any* application, however small, where the unique properties of carbon and graphite assure a convenience and economy to the user. In the following two instances, a few *pounds* of graphite serve literally *tons* of metal . . . efficiently and at a saving.

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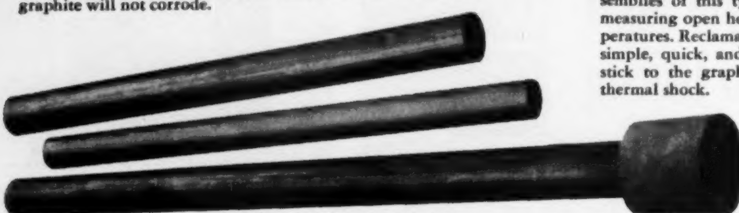

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## Deferments for apprentices . . .

■ Temporary military deferments are being granted to apprentices in trades essential to defense and civilian needs. Sponsors of apprentice programs wishing to obtain deferments must certify that their programs conform to all Selective Service requirements and standards governing the deferment order, according to W. F. Patterson, director of the Bureau of Apprenticeship.

Probably all pattern maker apprentice training programs and many foundry apprentice courses can be certified, but some foundries which have reduced their related training below the minimum requirement will encounter difficulties.

Procedures for requesting deferments vary. Sponsors of programs registered with the Bureau of Apprenticeship must use certificates available from Bureau field representatives authorized to certify their programs. Apprentice training programs registered with a state apprenticeship agency will be issued certificates certified by the agency. For requesting acceptance of unregistered apprentice training programs forms may be obtained from field representatives of the Bureau of Apprenticeship, the State Director of Selective Service, or field representatives of state apprenticeship agencies. With his request, the sponsor of an unregistered program must submit to the State Selective Service Director a copy of his apprentice training program or a detailed description of it.

In requesting deferment of individual apprentices employed in programs accepted for deferment purposes by the State Director of Selective Service, sponsors must apply to the local Selective Service Board, certifying that each apprentice for whom deferment is requested is meeting all standards and requirements of the apprentice training program, and that he has completed the required number of hours of on-the-job training and related instruction. Forms for requesting deferment of apprentices may be obtained by sponsors of accepted programs from local federal or state apprenticeship offices or from Selective Service.

## But let's not become complacent . . .

■ Consolation and a challenge are found in a statement by Walter C. McCrone, Armour Research Foundation, Chicago, writing in the ARF publication *The Frontier*. Discussing air pollution, he says: "Air pollution in any city is not due, to any large extent, to industry, railroads, or public utilities. These are usually concentrated sources of pollution which thereby attract attention, but their percentage contribution is small. The largest percentage contribution to air pollution comes from those who complain the loudest—the public."

Foundrymen, who in some areas have been made to feel they are the worst offenders, are thus only a part of the overall picture and anything they can do to clean up the air inside and outside their plants will be all the more noticeable by comparison with those who do not take seriously the problem of air pollution.

The challenge arises in the foundry industry's new Safety & Hygiene & Air Pollution Program which is leading the way to improved working and living conditions. Foundrymen participating in the program throug financial support, technical committee activities, and application of good health and safety principles are accepting the challenge. They are demonstrating that the foundry industry recognizes its place in a community and is interested in solving a community problem though its own part in creating that problem may be small.

***New tuyeres improve blast penetration***

# Better control of malleable iron

LEWIS KOCH / *Melting Supt., Ohio Malleable Iron Co., Columbus, Ohio*

**The ratio of tuyere area to cupola area and the volume and velocity of air has long been a subject of discussion among foundrymen, with little attention given to tuyere design and its effect on cupola performance. This article tells how a tuyere of novel design has helped improve duplex melting operations in a malleable foundry.**

▪ Metal of uniformly high temperature and correct chemical composition (Fig. 1) is absolutely necessary to insure the operation of continuous pouring units (Fig. 2). Control of coke, limestone, and materials in the metallic charge, while extremely important, did not secure the results demanded.

The temperature of the molten metal varied, melting rates dropped off sharply at times, and uniformity of chemical composition was unsatisfactory for the high-quality castings required. Failing to locate and remedy the source of trouble elsewhere, attention was turned to the air blast, a less obvious source of cupola raw material.

## Tuyeres, maybe?

The efficiency of the conventional tuyeres then in use was questioned. They were difficult to keep clean. Lining loss was excessive, maintenance was expensive, and occasional bridging above the tuyeres was experienced. These conditions all indicated that there was something wrong in the distribution of heat in and above the tuyere area, which included the melting zone of the cupolas.

It was decided to try a tuyere which had been successful in blast furnace operations by reason of its ability to cause better blast penetration (J. H. Sprow, "Tuyere of Novel Design Improves Furnace Operation", *Blast Furnace & Steel Plant,* April 1948), as this very lack of penetration appeared to be underlying the trouble.

## Change one cupola

An adaption of the double auger tuyere used in the blast furnace was installed in one cupola. The other cupola was left with the conventional tuyeres for comparison, and both cupolas were then subjected to nor-

**Fig. 1 . . . Melting in the air furnace.**

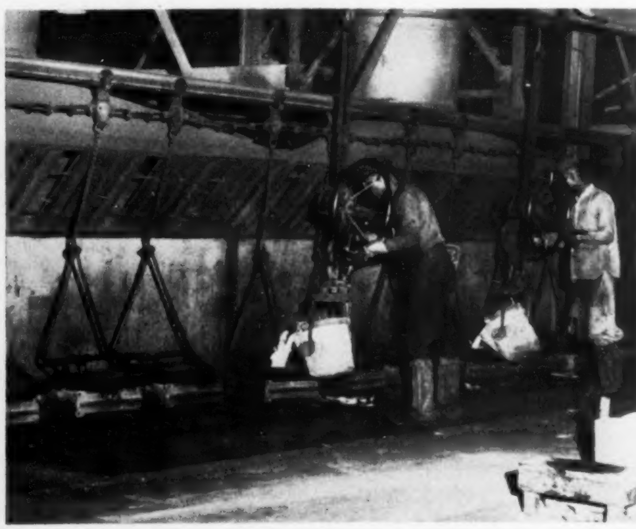


**Fig. 2 . . . Continuous pouring units need metal of uniformly high temperature.**

**Fig. 3 . . . Tuyeres and lining immediately after dropping the bottom.**

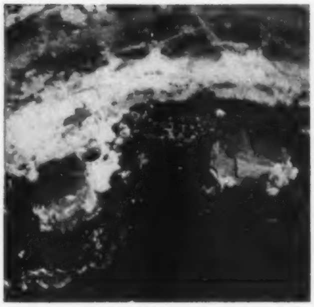


**Fig. 4 . . . Tuyeres and lining after loose deposits had been removed.**

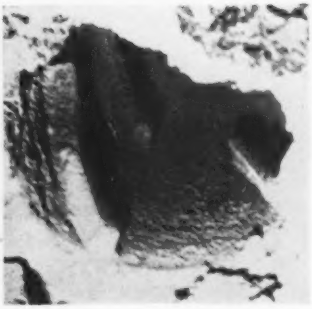


**Fig. 5 . . . Tuyere close-up, showing excellent condition of ribs.**

mal operating cycles for a period of nine months.

Lining destruction in the cupola with double auger tuyeres was less than in the cupola with conventional tuyeres. Burnout was even around the circumference of the cupola. The lining can be replaced and the contour held very easily by using a gun for patching.

## No tuyere repairs

No record of lining material was kept, but the difference in repair labor is obvious evidence of substantial saving. No repair has been needed in the tuyere area since installation. Figure 3 shows condition of tuyeres and lining immediately after dropping the bottom. Figure 4 shows tuyeres and lining after loose deposits had been removed from around each tuyere. Figure 5 is a close-up of one of the tuyeres, demonstrating that even the ribs suffered no deterioration during the nine months' test.

Temperatures were held constantly in the range from 2790 to 2840 F in the cupola with double auger tuyeres, while temperatures in the other cupola varied widely from these limits. A corresponding uniformity of melting rate was naturally experienced.

## How it works

Figure 6 shows the conditions believed to be present with double auger and conventional tuyeres—in other words, with and without improved blast penetration. Penetration to the center of the cupola is necessary if combustion is to take place uniformly over the entire cross-section. A weak blast, which does not penetrate, will cause combustion around the circumference and above the tuyeres, leaving little oxygen for combustion in the center of the cupola.

Figure 7 shows part of the split aluminum pattern from which the double auger tuyeres were made.

## Chemical analysis

In duplexing malleable iron, rigid chemical control is necessary if sound castings are to be produced; therefore the ultimate evaluation of the

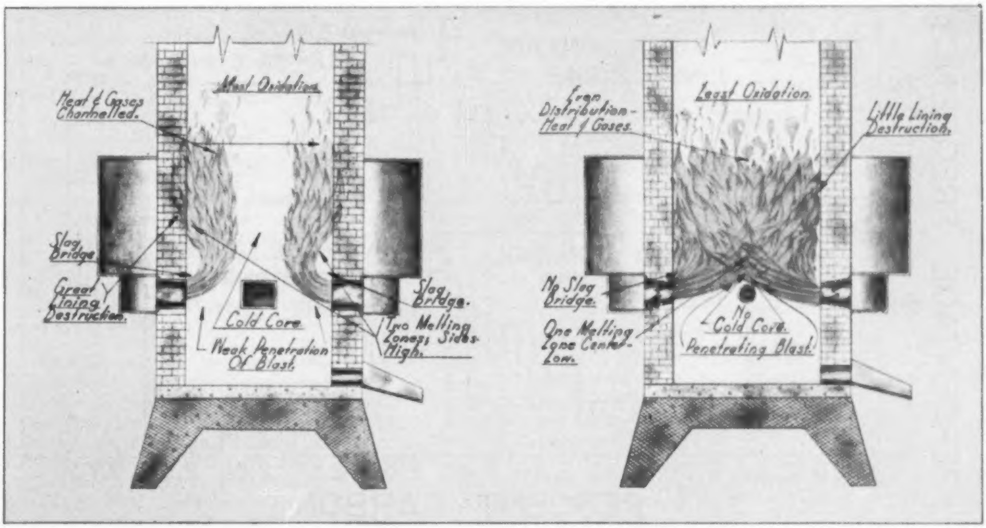



**Fig. 6 . . . Conditions believed to be present with conventional tuyeres (left) and the new double auger tuyeres (right).**

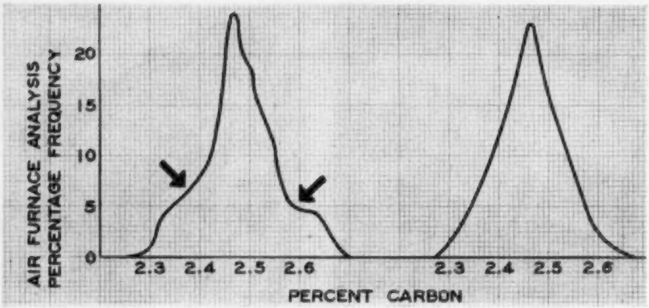



**Fig. 8 . . . Carbon control using conventional (left) and double auger (right) tuyeres. Arrows indicate plateaus caused by efforts to regain control.**

**Fig. 7 . . . Aluminum pattern from which double auger tuyeres were made.**

new tuyeres centered about the chemistry of the iron as cast. Control of the metal is maintained in the air furnace, but it reflects cupola conditions. Carbon was chosen as the element to be studied as an indication of overall chemical control.

## Results

The distribution curves of air furnace carbon determinations show a considerable difference in shape (Fig. 8). With the double auger tuyere, the curve has a uniform and normal distribution, while the other is irregular. No unusual measures were taken to obtain good control in the first case, whereas the plateaus on the other curve show that the air furnace was doped to prevent the carbon from going much lower or higher. Frequency histograms of the same data were made by standard statistical methods, and are shown in Fig. 9.

Average carbon was 2.481 per cent for the conventional tuyeres and 2.461 for the double auger tuyeres. Lower and upper control limits were 0.477 per cent carbon apart for the conventional tuyeres and only 0.411 per cent carbon apart for the new tuyeres.

## Upper limits critical

The greatest difference was on the two upper control limits, which were 2.719 per cent for the conventional tuyeres and only 2.667 per cent for the new tuyeres. The difference at these limits was therefore 0.052 per cent carbon, which is critical in terms of primary graphite.

Oxidation is a serious matter in any melting unit where metal and air are in intimate contact with each other. In duplexing, this is a problem in both the cupola and the air furnace. Since a study of losses by oxidation was not practical in the cupola alone, the losses sustained in the entire duplexing operation were considered.

It was found that the amounts of alloys added to the air furnace to maintain control showed significant differences. In some instances, additions were minimized or even eliminated when using metal melted with the new tuyeres. Overall losses were substantially less.

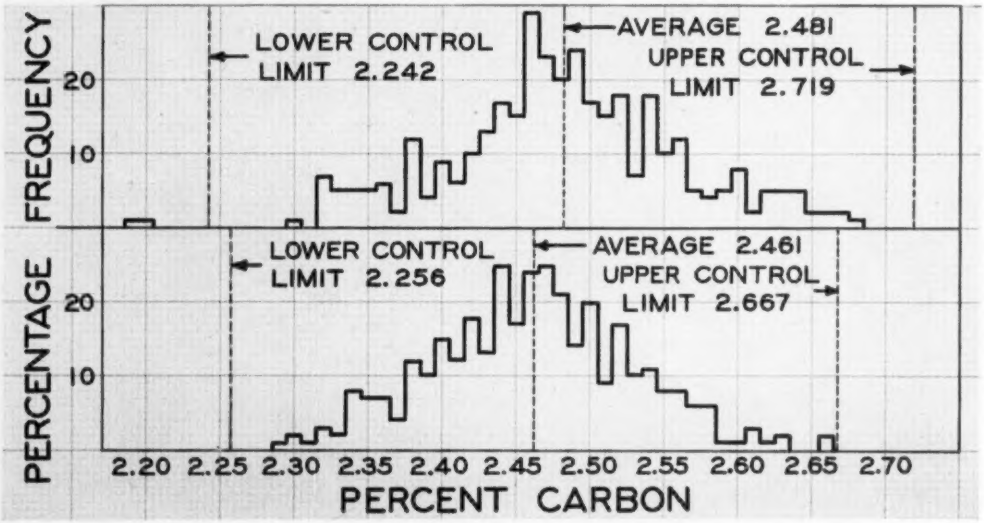



**Fig. 9 . . . Histograms of the data shown in Fig. 8. Analysis from conventional tuyeres is above, new auger tuyeres below.**

# *How to select abrasives for blast cleaning metals*

**Of the many types, sizes, and shapes of abrasives available, there is always one that will blast-clean a given part better, faster, and more economically than any other. This article deals with the selection of this best abrasive, considered in terms of the four primary factors: type of metal to be cleaned; shape of the part; kind of material to be removed; and the surface finish desired on the completed part.**

V. F. STINE/*Vice-president of Engineering, Pangborn Corp., Hagerstown, Md.*

■ Metals that are blast-cleaned range from toughest armor plate and cast iron to soft aluminum alloy, and vary in size from locomotives to dental drills. Surface coatings ranging from burnt-in sand to thin oil film can be blasted to produce effects ranging from deep abrading to gentle wiping. To cover this wide range of cleaning requirements, blasting-equipment manufacturers have developed a nearly equally wide range of abrasives from which to choose.

The first step in choosing the correct abrasive is to find out what abrasive materials there are to choose from, and the effects these materials have on the cleaning action. The second step is to consider the shapes and sizes of the abrasive particles and the effect of particle dimensions on the cleaning action. Third step is to consider the cost (abrasives and labor) per square foot of cleaning; cost factors would include cost of abrasive, time requirements, possibility of abrasive recovery, and cost of dust suppression. Finally, it is often helpful to review typical specific applications of the various abrasives and the reasons for their choice in each case.

## Abrasive materials

Abrasive materials fall into four groups: metals, chemical compounds, natural compounds, and agricultural grits. The material determines the hardness, absorbing ability, cutting ability, and deterioration tendencies of an individual particle. The most commonly-used abrasives are listed in Table 1. The hardest material in each group is listed at the top of that group with the others following in order of decreasing hardness.

On the Rockwell C scale, chilled cast iron has a hardness of 62, cast steel rates 47, and malleable iron registers 37. On the Moh's scale, silicon carbide rates 9.6 while aluminum oxide rates 9.2. For the natural abrasives (also on Moh's scale), garnet rates 8.0; quartz and silica both register 7.0.

The hard abrasives cut deeper and faster than the others. For that reason chilled cast iron, malleable cast iron, and the natural abrasives are used for removing scale and burnt-in sand, and for knocking out cores from iron and steel castings.

In spite of the faster cleaning action of the hardest particles, only those soft enough not to embed in the metal should be used. If the abrasive particles lodge in the work, they can damage machine tools, and in the case of aluminum or brass will corrode the casting.

## Soft abrasives

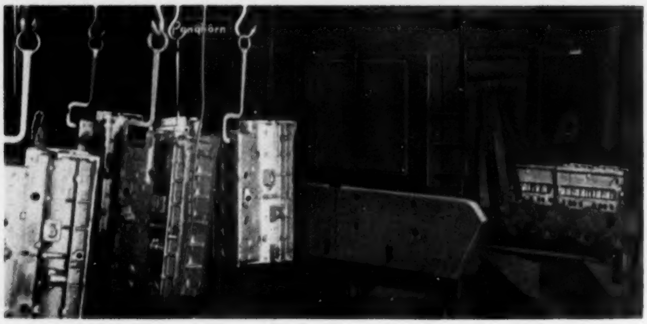
Abrasives softer than the metal they clean can remove material without substantially changing the dimensions of the metal. Even though nozzles are made of hard manganese alloy and boron carbide (said to be the hardest material known except diamond), prolonged flow of abrasive will wear them down. Softer abrasives wear nozzles less than hard abrasives.

Agricultural abrasives serve particularly well in cleaning grease, oil, carbon, and similar material from finished parts and assembled equipment. Because such abrasives are often residues, they are much less expensive than petroleum-base solvents. The absorbing ability of the particles gives an effect similar to wiping. The most common abrasives are ground corncobs, small cubic

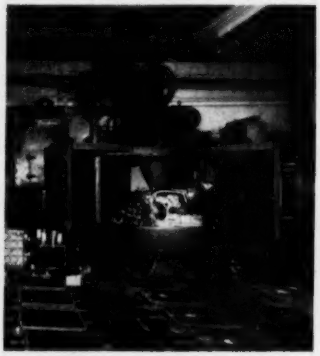
TABLE 1

Abrasives Currently in Most Common Use

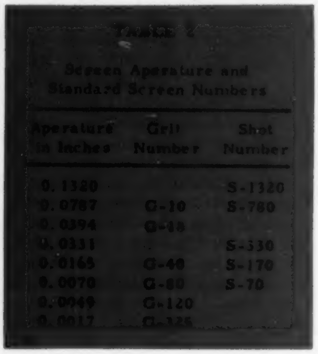
| |
|---|
| **Metallic Abrasives** |
| Chilled cast iron |
| Cast steel |
| Malleable iron |
| Crushed steel |
| Cut steel wire |
| Aluminum shot |
| Brass shot |
| Copper shot |
| **Artificial Abrasives** |
| Silicon carbide |
| Aluminum oxide |
| Glass beads |
| Refractory slag |
| Rock wool by-products |
| **Natural Abrasives** |
| Garnet |
| Quartz |
| Silica |
| Decomposed rock |
| **Agricultural Abrasives** |
| Cocoanut shells |
| Black walnut shells |
| Pecan shells |
| Peach-pit shells |
| Filbert shells |
| Cherry pit shells |
| Almond shells |
| Apricot pit shells |
| Rice hulls |
| Ground corn cobs |



Large shot is preferred for intricate castings such as these cylinder blocks because of its ability to rebound and deliver multiple impacts.



Bronze castings should be cleaned with malleablized shot or grit because of its softness and burnishing action.



Screen Aperature and Standard Screen Numbers

| Aperature in Inches | Grit Number | Shot Number |
|---|---|---|
| 0.1320 | | S-1320 |
| 0.0787 | G-10 | S-780 |
| 0.0394 | G-18 | |
| 0.0331 | | S-330 |
| 0.0165 | G-40 | S-170 |
| 0.0070 | G-80 | S-70 |
| 0.0049 | G-120 | |
| 0.0017 | G-325 | |

Aperature is that of the so-called "nominal" screen—the largest which will retain a large amount of the sample.

Corn cobs are being used to clean this electrical equipment because they will not damage the insulated wiring. Such agricultural abrasives are inexpensive.

hard-wood particles, and nut shell aggregates. Various degrees of abrasiveness can be obtained by mixing a soft agricultural grit with a harder one, usually rice hulls.

## Blasting equipment

The type of blasting equipment on hand influences the choice of abrasive. Four types of blasting are commonly used and can be designated by their propellant force—compressed air, centrifugal, high pressure water, and a combination of compressed air and water.

Compressed air uses any type of abrasive and gives a blast pattern under close control. By varying pressure or use of induction abrasive flow, the blast intensity can be closely regulated. Equipment usually is of simple construction and requires little maintenance. It is possible to clean interior surfaces, chambers or holes, etc. The air stream removes the spent abrasive from the surface.

Centrifugal is the most efficient with metallic abrasives requiring less horsepower per pound of abrasive thrown.

High pressure water uses sand abrasive to remove sand cores and clean surfaces at one operation. It has the added advantage of being dustless.

Compressed air and water uses sand or natural abrasives of very fine grain size and produces smooth satin surface finish. Blast pattern is under close control. It is dustless.

Hydraulic equipment—which cleans by spraying the surface with abrasives suspended in water—uses aluminum oxide, quartz, silicon, carbide, silica and very fine-mesh natural abrasives (up to 5000 mesh). Agricultural abrasives in most instances require compressed-air blasters because individual particles are quite light. Air blasting uses chilled cast iron or sand for difficult jobs and malleable abrasive for lighter cleaning tasks.

## Particle shape and size

Most metallic abrasive particles can be classified as shot or grit. Shot is as nearly spherical as economy in manufacturing will allow. Grit is irregular and has many cutting edges. A few abrasives such as cylindrical cut wire and cubic hardwood particles do not fall into either classification.

Shot abrasive gives a peening effect. It hammers the metal, cracking and lifting the material to be re-

moved. Grit both hammers and cuts the surface it is cleaning. Because of this difference in cleaning action, grit and shot are used for different applications. Basically, shot is used to remove foundry sand while grit is used for removing paint and rust and for preparing surfaces for further finishing.

When deciding on the abrasive size, consider the shapes of the metals to be cleaned. Because large shot ricochets when it strikes a surface, it is particularly good for cleaning intricate castings. Large shot will bounce to hard-to-reach surfaces and will therefore do multiple cleaning before spending its energy.

Section thicknesses of the part being cleaned limit the size of the abrasive that should be used. Because larger particles are usually heavier, they develop greater kinetic energy, strike the surface with greater force, and peen the metal more vigorously. Heavy peening is very desirable in many cases. However, if the sections are thin the surface exposed to the barrage could possibly stretch enough to warp the sections.

The size of abrasive particles governs the coverage provided by the bombarding stream. Smaller particles give more uniform coverage with more overlapping and less chance to miss part of the surface in a once-over-lightly blasting.

## Particle dimensions

Particle dimensions also affect the surface finish provided by blast-cleaning. Small particles give fine finishes; large particles produce coarser finishes. Shot gives a smooth, minutely dented surface; grit gives a rough surface covered with very small irregular cuts.

Because of the irregular shape of grits it is difficult to specify their size. The ASTM has devised a system for measuring the size of both grits and shot, based on passing a sample of the abrasive through a series of screens with diminishing mesh sizes. Three screen sizes—the high screen limit, the low screen limit, and the nominal screen—indicate the size of the particles.

The high screen limit is the size of the smallest screen which is too large to retain any of the sample. The low screen limit is the size of the largest screen which is too small to pass more than a given percentage of the sample. Percentages range from 5 to 25 per cent for shot and 10 to 35 per cent for grits. The nominal screen is the largest one which will retain a large percentage of the sample—85 to 65 per cent for shot and 80 to 20 per cent for grits.

Abrasive size is usually referred to by the aperture size of the nominal screen. The aperture is the distance between consecutive screen wires. Screen numbers have been assigned arbitrarily to aperture sizes to simplify the nomenclature. The screen number is used in specifying grits. For instance, G-18 means grits of nominal screen size number 18 or, referring to Table 2, an aperture of 0.0394 in. Similarly, S-330 means shot whose sample has a nominal screen aperture of 0.0331 in.

## Ferrous castings

More than half the abrasives consumed each year are used to clean foundry sand and scale from ferrous castings. Cast iron is usually bombarded with S-550 to S-230 shot and G-16 to G-40 grits; malleable iron takes S-550 to S-330 shot and G-18 to G-40 grits; and steel takes S-660 to S-390 shot and G-14 to G-25 grits. Differences in choice arise from differences in shape of the part to be cleaned, surface finish desired, and type of blasting equipment being used, as discussed previously.

The most effective abrasive that will not cause warping should be used to clean steel sheets and plates. Armor plate, which is hard, heavy and usually covered with thick scale, requires G-14 to G-25 abrasive. Sheets and plates from 0.25 to 0.1093 in. require G-40 to G-50; from 0.1093 to 0.05 in. take G-80 and finer; and under 0.05 in. need liquid media.

Weld splatter removal from castings requires hard metal grits to dig under the tenacious splatter. Fine finishes and uniform coverage of the work are usually desired. Sizes G-25 to G-40 are best.

Removal of rust and other corrosives covers many degrees of tenacity of deposit. Metal or sand abrasives are usually used. But, for the less tenacious corrosives, corncobs, wood particles and other agricultural grits are sufficiently abrasive. Proper size ranges are from G-18 to G-50.

Paint removal is usually more satisfactory if the finish after cleaning is smooth so less paint will be used in repainting. G-40 to G-50 abrasive is recommended.

Surface cleaning for applied finishes is generally governed by the thickness of the finish to be applied. Thick finishes call for more coarse cleaning to provide tooth for the coating. Grit sizes G-18 to G-40, depending on the type of finish, satisfy most requirements. Free carbon left on surfaces for sanitary enamel can cause the enameled surfaces to blister, bubble, or lift. Free carbon can be removed before enameling by passing the work over fuming nitric acid or using a small percentage of foundry sand mixed with the abrasive. A good way to combat the free carbon problem is to use a special malleable abrasive which contains carbon only in combined form.

## Non-ferrous castings

When cleaning non-ferrous castings, care must be taken not to embed the abrasive in the metal. For brass, bronze, and magnesium castigs, G-50 malleableized abrasive is recommended because of its softness and burnishing action. If shot is used, S-170 is recommended and malleableized shot is preferred.

Many blast-cleaning jobs are special applications that can only be solved by experiment and by study of the particular problem. Aluminum rolls for drying cellophane are cleaned by S-230 to S-460 cast steel shot—to roughen the surface and provide traction for the film web passing over them in the drying process. Cleaning railway car wheels and axles in preparation for "magnafluxing" to test for cracks demands G-80 chilled cast iron grits.

**▶ *Shell molding unscrambled in new government publication***

■ Shell molding is brought up to date in a report just released by the Office of Technical Services, U. S. Department of Commerce. Widespread developments and the complicated patent situation are covered in the report which discusses quality of product, dimensional accuracy, metals and size limitations, etc.

*"Current Status of the Shell Mold or 'C' Process of Precision Casting Metals,"* publication Pb 106 640, sells for 25 cents. Check or money order should accompany order to the Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C.

**▶ *Wanted—Used Copies of Volume 58, Transactions of A.F.S.***

■ The A.F.S. National Office is buying used copies of TRANSACTIONS (vol. 58, 1950) to meet the high demand for this edition. Copies in good condition which are not needed by their owners can be sent to A.F.S. at 616 S. Michigan Ave., Chicago 5, Ill.

# *Current status of shell molding*

RICHARD HEROLD / *Mgr., Fdy. Products Dept., Borden Co., New York*

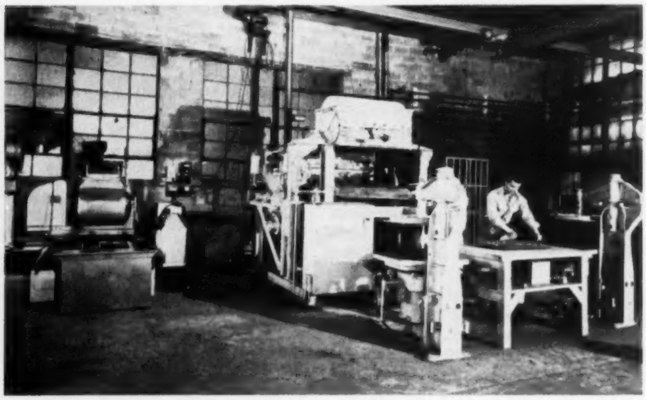
**Shell molding has advanced rapidly though quietly in many quarters since it was first announced through FIAT Report 1168 prepared by William W. McCulloch, American Cast Iron Pipe Co., Birmingham, Ala., for the U. S. Office of Military Government for Germany, May 30, 1947. This paper, based on Richard Herold's popular talk on shell molding, and illustrated with equipment shown in his company's booth at the 1952 International Foundry Congress, during the recent Cooper Alloy Foundry Co. (Hillside, N. J.) open house, and in the non-ferrous foundry of City Pattern Foundry & Machine Co., Detroit, helps bring shell molding up to date.**

■ Shell molding has advanced within the United States at a tremendous rate, despite a confused patent situation, lack of ready-designed equipment and secrecy. It is probably safe to say that there are few production foundries not actively engaged in an evaluation of the technique, if not actually producing on a pilot plant scale. A number of foundries are actively involved in full-scale shell molding production.

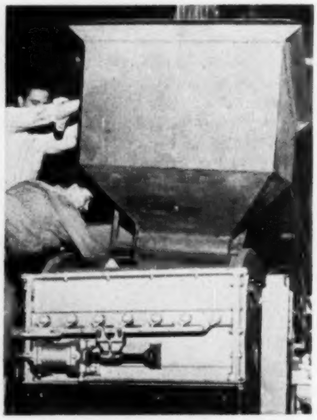
The process is currently being used for many parts formerly fabricated, forged, or cast by conventional methods. Examples include railroad and aviation castings, radiation and boiler sections, plumbing fittings and pressure pipe, electrical fittings, diesel and marine castings, automotive and agricultural castings, hand and machine tools, and home utility items.

## What will it do?

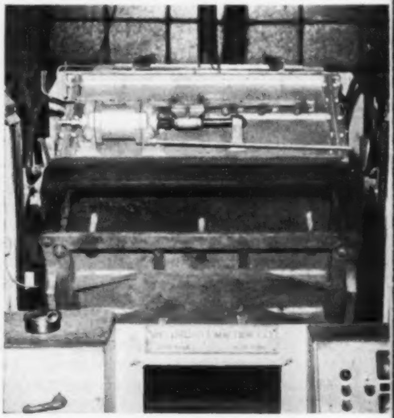
The shell molding technique has many inherent advantages. It offers precision casting at conventional sand casting costs; reduces sand handling and eliminates much sand handling equipment, thus cutting factory space requirements; and extends the possibility of using un-



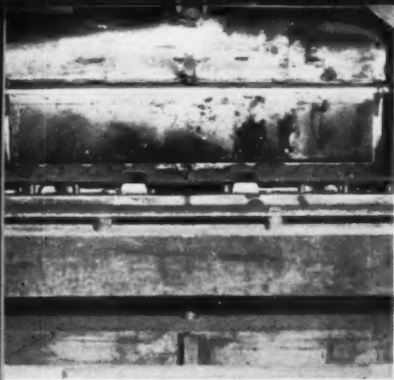
**Shell mold division of Cooper Alloy Foundry Co., Hillside, N. J. Scale and sand supply (comes through window pane) are at left. Shell molds are produced on machine in center, assembled and closed with equipment in right foreground.**



**Filling dump box on top of shell making machine with sand-resin mixture. Cylinder and levers operate louvers which drop mixture onto hot pattern.**



**With dump box against pattern plate, mixture is dropped through louvers to form shell. Here the unit rolls over to return excess sand mix to dump box.**

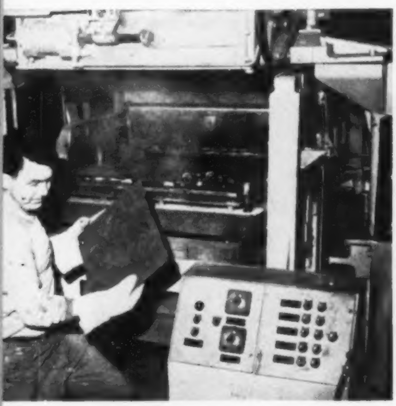


Ejecting pins lift shell after baking.

skilled and female labor. Greater casting accuracy reduces machining operations and saves metal. Castings to a tolerance of 0.002-0.003 in./in. are claimed, and the author has seen castings produced within 0.001 in./in. specification.

Even with the increased production made possible, shell molding makes the foundry a clean and pleasant place to work. One exponent of the process equips his workers with white smocks!

Experience to date indicates that shell molding is particularly well-suited to aluminum; gray, nodular, and malleable iron; low-lead, low-tin bronzes; brasses; non-machining alloys; and high-alloy steels. Limited work on magnesium shows promise, the inhibitor being incorporated in the sand mixture used for the shells. While early work in the shell molding of low carbon steels was somewhat discouraging, more recent work indicates that previously encountered surface difficulties are being overcome. Sweating of high-lead and high-tin bronzes continues to be a problem. Excellent work has been done in stainless steel and in cobalt-chromium-tungsten combinations.



After short bake in oven (background), ejecting pins lift shell from pattern, workman removes shells for assembly.

Illustrating another type of shell mold machine, worker starts by spraying liquid parting on patterns.

Pattern plate turns forward to cover dump box. Dump box inverts to throw sand-resin mixture onto hot pattern.

With dump box upright again and pattern in original position, oven in background moves forward to bake shell, then retracts for removal of mold half.

Completing a cycle of about one minute, worker removes baked shell with tools made of angle iron and transfers it to bench for assembly.

## Size and production

Although 20 to 30 lb was formerly considered the limit, castings in excess of 200 lb are now being made. There seems no reason to conclude that this is the maximum size, as ways to push this limit upward will unquestionably be found.

As to production speed, a mold-making cycle of less than 30 seconds is being used where oven temperatures of 1000 F are available. Speed is in a sense limited by the charring point of the phenolic resins, 570 F, which the resin-sand mix should never reach.

## Backing the mold

Steel shot was originally cited as the preferred supporting material and continues to hold that preferred position. Sand and other coarser aggregates have been used for certain work with some degree of success. Good results have been encountered

in pouring certain lighter castings with no supporting medium whatsoever. Certain jobs, critical from the standpoint of concentricity, may require what might be called a backup shoe, the face of which matches the contours of the outside of the mold. Obviously, such a device is justified only where production runs are sizeable.

For stack-molding operations, as well as for holding shells unsupported by shot or similar materials, it is essential to have a mold assembly having parallel sides so that any pressure against opposite sides of the mold is distributed evenly. At least two methods have been devised, one involving "striking off" or "rolling off" high points on the back of semicured shells, the other involving parallel grinding of similar high spots on cured shells.

Whereas there were early hopes of controlling the rate of metal solidification by variation of supporting material, recent experience indicates that the insulating qualities of the shell nullify the effect of any difference in thermal conductivity of the supporting medium. This same insulating effect makes it possible to pour at lower temperatures than those common for similar castings in green sand, and to successfully run thinner sections.

## Heat sources

While oil and gas-fired ovens have been most widely used in the past for both shell curing and pattern heating, there is now a growing interest in electrical and in gas infrared heating which, on the basis of theory at least, represent the maximum in efficiency. The importance of constant pattern temperature has been somewhat neglected. Since uninterrupted production depends not only on a constant oven temperature but also on constant pattern temperature, there is much justification for considering the use of electrical resistance heaters incorporated in the pattern itself. These can be either cast into the pattern or attached to it. Heat input can be thermostatically controlled. This represents a far more reliable method than the old system of expecting the pattern to soak up sufficient temperature for the next forming operation during the shell curing stage. In this connection it is well to bear in mind that the pattern loses approximately 50 F upon investment with room-temperature sand.

**Plastic strip method of fastening shells together. Sealing strips are applied by hand at critical locations.**

**Cold adhesive method of holding shells together uses applicator designed to transfer glue to flat surfaces only.**

**Mating halves are joined and clamped. Adhesive dries in approximately 30 seconds and shells are ready to pour.**

**In plastic strip method, mold is squeezed in modified standard molding machine. Springs equalize pressure.**

With a typical present day dry resin-sand shell molding mixture, the blowing of cores is a difficult undertaking. During any blowing application, the lighter resin has a tendency to pass through the heavier sand, leaving the sand grains with no bonding agent. There is also the problem of gaining adequate resin-sand distribution over all surfaces of complicated core boxes.

Where cores are relatively simple in shape and characterized by large prints which permit ready entrance and exit of resin-sand mixture to the heated core box, it is quite easy to produce shell cores, singly or in gang.

Recent experience fully justifies the use of conventional solid cores bonded with either resin or core oil. This does not sacrifice accuracy, since the core print is rigid and the core is maintained in a fixed position during pouring.

There is much interest in the development of phenolic resins applied in liquid form, the solvent for which evaporates during the mixing of the resin with the sand, leaving each individual sand grain coated with a fixed film of resin. Such a system, still not perfected, will overcome difficulties of segregation and dusting.

## Mechanization

Very encouraging progress has been made with respect to the mechanization of shell molding. There are several fully mechanized shell molding foundries now in operation and there are at least six manufacturers of equipment supplying single pattern as well as multiple pattern types. The largest that we have encountered is a 12-station, rotary machine producing a shell approximately every 10 seconds.

You can spend as little as $4,800 and as much as $75,000 on a shell mold making machine. A single large

shell can be produced by each pattern or, if desirable, the pattern area may be divided to produce several smaller shells over the same pattern area. The machines available can be operated by means of manual controls on a fully automatic push-button basis.

## Resin and sand

Cost of resin for the bonding process is not inconsequential. Shape and size of sand grain used as well as clay content have a bearing on the amount of resin needed. The strength of the finished shell also dictates the amount of resin used. Shell molding originally called for 6 to 8 per cent resin by weight, but good production work is now being done at resin levels varying from 3½ to 6 per cent, an important factor costwise.

The previously mentioned possibility of using a liquid-applied resin should offer further economies, due to more efficient employment of resin through avoidance of dust losses.

Undoubtedly many good sources of sand for shell molding are located strategically for the foundry industry. Apart from requiring a relatively clay-free and clean silica sand, it has been found extremely desirable, particularly with the searching metals such as brass, to employ a sand or blends of sands having a rather broad screen distribution with the majority of the sand distributed over four to six screens as opposed to the usual two or three screen sand.

The original information about shell molding contained data on joining the mold sections by pasting. This method has long been by-passed in favor of such mechanical methods as the use of bolts and nuts, wire clamps, and tape. Pasting is gradually returning to favor, however, and the development of superior synthetic resins and rapid-setting adhesives should spur its acceptance. Such adhesives may be secured in liquid, powder, or tape form. Their use is recommended because they impart rigidity to the mold, minimize swelling and finning, thereby contributing to greater casting accuracy.

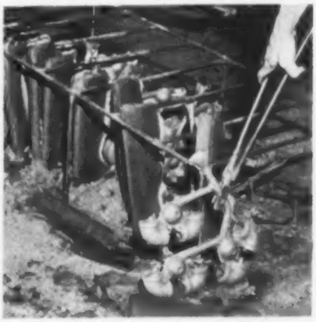
While metallurgists seem generally agreed that a polished gray iron pattern of about 3.65 carbon content is most desirable, it is true that most any metal, properly worked and finished, will perform with complete reliability. Much work is being done today in copper-base alloys, bearing bronzes, aluminum, and special inoculated irons.

In selecting a pattern metal, the guiding consideration is ultimately going to be that of cost, and here the length of the production run, ease of producing the pattern, and the abuse to which the pattern may be put will all be influencing factors.

## Gating and risering

Smoother interior mold surfaces having a lower chilling rate permit a reduction in gate and runner sizes. General experience indicates the wisdom of using an ingate considerably smaller than required for conventional molding. A tapered downgate is easily kept full of molten metal and prevents aspiration. Gates

**Stainless steel at 3100 F goes into shells. Simple rack holds plastic strip sealed shells. During International Foundry Congress, scene was duplicated in display where shells were held together with fast-setting cold adhesive.**



**Burned-out shell falls away readily as steel pipe elbows are removed from molds. Sand is not reclaimed for re-use.**

**Storage rack in shell mold foundry holds more than 200 molds. Shells are strong and stand handling and storage well. Some plants are reported to be making molds, trucking them to foundry where metal specified by customer is poured.**

and runners that are round in cross-section permit flow of molten metal with a minimum of surface friction and turbulence. Slag traps and slag chokes incorporated in the runners are usually helpful. Bottom gating has usually been found necessary to secure the maximum casting smoothness and soundness. Shrinks may often be overcome by addition of a blind riser to feed the affected part.

Being unfamiliar with shell molding, many people have mishandled it and failed to secure good results. Here are some of the commoner points of caution.

Except for the attainment of specific working qualities, it is quite important to avoid any introduction of moisture. This means that containers of resin should be closed immediately upon withdrawing necessary supplies. Only one day's supply should be withdrawn and mixed with

**Standard cores are most frequently used in shells. These will be baked in infra-red oven with woven wire hearth.**

**Bottom gating is widely used in shell mold work, with blind risers or shrink bobs being used as required.**

**These shells are held together with large staples which act as clips. Cores used are regular, solid pin cores.**

**Eleven molds, 10 cavities per mold, are being poured in this picture made in City Pattern Foundry & Machine Co., Detroit. Shells are backed up with shot which discharges through flexible metal hose for convenience in handling.**

the sand. A mixture of sand and resin that stands overnight will draw moisture the way table salt does. Moisture contributes greatly to a reduction in strength of the shell.

Overcuring contributes to weakness and will result in soft, friable edges and surfaces. Undercuring lends lack of strength and distortion. Inadequate mixing, too-fine sand, and separation of sand and resin in the reservoir all result in lack of uniformity and voids.

Non-uniformity of pattern temperature results in unreliable shells, some overcured, some undercured, and some possibly meeting production requirements.

Insufficient resin-sand burden on the pattern during the forming stage may result in voids on the mold surface where the mixture has failed to fill in properly. The extent of overburden required will vary with the complexity of the pattern; a minimum of four inches is suggested for laboratory evaluation.

For prevention of peel-back or premature stripping of the partially cured shell from the pattern and to avoid build-up of the resin and sand residue at the rim of the dump box, it is suggested that the pattern be equipped with a metal rim, flange, or gasket, which matches exactly that portion of the dump box which normally impinges directly against the pattern. Such a rim or flange should be at least 1/8 in. thick with a slight draft to minimize any tendency to stick during stripping.

Shell molding holds out important promises to the foundry industry. It has enabled the foundry to recapture work lost to weldments, and to compete on a more effective basis with the forging industry. The ability to use female and unskilled labor is of great importance, and the cleaner and healthier molding conditions are certainly a long step in the right direction.

Its advantages are every bit as broad as originally thought.

## ▶ *Arnold Lenz killed in auto crash*

■ Arnold W. Lenz, 64, a vice-president of General Motors Corp. and general manager of the Pontiac Div., and his wife, Amelia, 53, lost their lives in a grade crossing accident near Lapeer, Mich., July 13. Mr. Lenz died in the crash, Mrs. Lenz in a hospital in Flint.

A past national director of A.F.S. and recipient of the Society's Whiting Gold Medal in 1934, Mr. Lenz is the only foundryman to become a vice-president of General Motors. He was born in Hauingen, Germany, May 10, 1888. In 1906 he came to the United States, spending his first two years at New York State Normal School, Fredonia, N. Y. He started his industrial career in 1908 when he entered the employ of Browning Foundry Co., Ravenna, Ohio. After working as a molder, core maker, and melter at Alliance Brass & Bronze Co., he became foreman with Ryder Brass Foundry Co., Bucyrus, Ohio. Next he was assistant foundry foreman with American Clay Machinery Co. of the same city; then he joined American Range & Foundry Co., Cleveland, as assistant to the manager.

In May 1916, Mr. Lenz became an instructor in the foundry of the Buick Motor Co., Flint, and in the same year was promoted to general foundry foreman and assistant superintendent. In January 1919, he accepted a position as assistant to the manager of the Aluminum Casting Co., Detroit, but returned to General Motors the following May as superintendent of the gray iron foundry of the Saginaw Products Co. Saginaw, Mich. In 1922 he became manager of that plant and in June 1925 was promoted to assistant manager of Saginaw Products Co.

In 1927 Chevrolet Motor Co. took over the gray iron foundry, and he transferred to Chevrolet as foundry manager. In 1932 he became assistant manufacturing manager in charge of Flint, Saginaw, and Bay City plants of Chevrolet, and in July 1941 he was transferred to the central office where his activities as assistant manufacturing manager were extended to cover also Detroit, Toledo, Ohio, and Muncie, Ind. He served as manufacturing manager of the Chevrolet-Cleveland Div. from 1946 until he became executive assistant to the general manager of Pontiac in October 1947. He assumed his last position at Pontiac January 1, 1951, and was elected a vice-president shortly thereafter.

**Arnold W. Lenz**

In 1934 the University of Aachen, Germany, conferred upon him the honorary degree of doctor of Engineering.

Mr. Lenz served as president and chairman of the board of regents of General Motors Institute from 1934 to 1944. He was an officer and director of many organizations, civic groups, and business firms.

He married Amelia Kampter January 22, 1937. The couple's three daughters—Katherine Elizabeth, Nolda Amelia, and Barbara Marie—survive them.

Old friends and co-workers say of Arnold Lenz that his detailed knowledge of the foundry combined with conscientious application of energy and executive ability led to his steady advancement. He did not believe in continually changing equipment but was constantly improving methods to eliminate causes of scrap and work which consumed unnecessary time. When mechanization of Saginaw Products gray iron foundry was first suggested, one of his close friends recalls, he was violently opposed, but when it seemed the thing to do he did his best to help with the layout and make the mechanized plant pay off.

He was a hard worker and admired by those who worked with him. They credit him with some of the first advances in high speed molding and better efficiency in the foundry.

## ▶ *Ohio leads off 1952-53 regionals*

■ Regional foundry conferences start this fall with the 5th Ohio Regional scheduled for Ohio State University, Columbus, Ohio, September 26 and 27. D. C. Williams, Ohio State University, general chairman of this year's Ohio Regional, has announced the following program:

### Friday, September 26

9:00 a.m.—REGISTRATION. Ohio State Museum.

10:30 a.m.—WELCOME BY HOST CHAPTER. Wm. T. Bland, Commercial Steel Castings Co., Marion, Ohio.
WELCOME TO CAMPUS. Kenyon S. Campbell, Ohio State University.
*"The Boss and You—How do You get Together?"* Major Charles T. Estes.

12:30 p.m.—LUNCHEON. *"Alaska,"* Richard Anderson, Battelle Memorial Institute, Columbus, Ohio.

2:00 p.m.—*"Metal Removal,"* Gerald J. Grote, Unitcast Corp., Toledo, Ohio.

3:30 p.m.—*"Gases in Metal,"* C. E. Sims, Battelle Memorial Institute.

7:00 p.m.—BANQUET. Deshler - Wallick Hotel.
*"Problems in Our Atomic Age,"* Alfred B. Garrett, O.S.U.

### Saturday, September 27

9:30 a.m.—GROUP MEETINGS.
Gray Iron . . *"My Experiences as Superintendent of a Gray Iron Foundry,"* John A. Sharritts, John A. Sharritts & Co., Cleveland.
Steel . . *"A Modern Method of Determining and Utilizing Grinding Wheel Efficiency in Incentive Pay Systems,"* Patrick Collins, Michigan Steel Casting Co., Detroit.
Non-Ferrous . . *"Aluminum Alloy Test Bars—Their Meaning and Production,"* Donald L. LaVelle, Federated Metals Div., American Smelting & Refining Co., Barber, N. J.
Malleable . . *"Effect of Oxidizing Rates during Cupola Melting on the Graphitization of Malleable Iron,"* Milton J. Tilley, National Malleable & Steel Castings Co., Cleveland.

10:30 a.m.—GROUP MEETINGS.
Gray Iron . . *"Cupola Operation,"* Ford B. Snyder, Hickman-Williams Co., Chicago.
Steel . . *"Metallurgy and Mechanics of Hot Tearing,"* W. S. Pellini, Naval Research Lab., Washington, D. C.
Non-Ferrous . . *"High Strength Aluminum Alloys without Heat Treatment,"* Donald L. Colwell, Apex Smelting Co., Chicago.
Malleable . . *"Malleable Iron Practice,"* James S. Lansing, Malleable Founders' Society, Cleveland.

12:00 noon—LUNCHEON. *"Industrial Mobilization,"* speaker from Wright-Patterson Air Force Base.

2:00 p.m.—FOOTBALL GAME. Ohio State University vs. University of Indiana.

# Technical Correlations Committee meets to plan

# *A.F.S.' 1953 technical program*

■ The future technical course of A.F.S. was plotted at a five-hour meeting of the Technical Correlation Committee held on June 9 in the Emerald Room of the Hotel Sherman, Chicago. Present were the chairmen and vice-chairmen of technical divisions and chairmen of general interest committees, presided over by H. Bornstein, Deere & Co., Moline, Ill.

Mr. Bornstein called the meeting to order at 10:05 a.m. S. C. Massari, A.F.S. Technical Director, then introduced those present and stated the aims of the meeting—to report on past year's activities, announce plans for the coming year, and compare notes to avoid duplication of work.

First to report was Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, chairman of the Aluminum & Magnesium Division. Its great activity is attested by the many new investigations, the eight papers presented at the 1952 Convention, and the 16-mm color film, *"Effect of Gating Design on Casting Quality"*.

Program & Papers Committee has already been assured of three papers for the next convention, with others in the tentative stage. One full session has been planned on titanium. Alloy Recommendations Committee collected data on foundry characteristics and physical properties of aluminum alloys and published these data in the November 1951 issue of AMERICAN FOUNDRYMAN. Comments received were reviewed, and final revised data were given to ASTM for use as supplements to their sand and permanent mold specifications. Similar data on die cast alloys will be developed as soon as possible.

Casting Requirements Committee felt that much of the work they were investigating was not required; they were therefore dissolved until interest from industry indicates that a revival is needed.

Test Bar Committee is making plans for two types of patterns to be submitted to a number of foundries for pouring specified aluminum alloys. Results will be evaluated to see which type of pattern is preferable.

Mr. Brown announced the formation of a Shell Molding Committee within the Aluminum & Magnesium Division. B. N. Ames, New York Naval Shipyard, Brooklyn, N. Y., stated that the shell molding process is definitely in public domain, according to the U. S. Department of Commerce.

## Brass & Bronze

Reporting as chairman of the Brass & Bronze Division, Mr. Ames said the division was especially proud of the turnout of its shell molding session at the recent convention, where the spectators overflowed the room to crowd the corridors.

The Research Committee continued its program at the University of Michigan on the development of a quick fracture test for brass and bronze foundry alloys. Opinion is that the test is not only useful but valuable, and that concentration on the preparation of acceptable visual standards for comparison is the next step. Also needed is an educational campaign to "sell" the project to operating foundrymen, and some method of reclaiming the below-par metal detected by the process.

Future plans are to obtain high quality black and white prints and to judge quality by fracture texture rather than color; and to consider making a film showing the mechanics of performing the test, which should be made available to A.F.S. chapters without charge.

The Recommended Practices Committee announced that the text for COPPER-BASE ALLOYS FOUNDRY PRACTICES was completed during the year. (EDITOR'S NOTE: The book has been published and is now available.)

Due to the resignation of A. K. Higgins, divisional chairman, it was necessary to elect this new slate of division officers: Chairman, B. N. Ames, New York Naval Shipyard, Brooklyn, N. Y.; Vice-chairman, W. B. Scott, American Brake Shoe Co., Meadville, Pa.; and Vice-chairman of Program & Papers Committee, R. J. Keeley, Ajax Metal Co., Philadelphia.

## Publications

H. M. St. John, Crane Co., Chicago, chairman of the Publications Committee, told how the committee plans the Society's publications program. Publications issued in 1951-52 included TRANSACTIONS, Vol. 59; FOUNDRY WORK; FOUNDRY SAND HANDBOOK (Sixth Edition); 1952 Preprints; SYMPOSIUM ON PRINCIPLES OF GATING; and COPPER-BASE ALLOYS FOUNDRY PRACTICE. The PATTERNMAKING MANUAL is now in process of publication, and so is an extensive bibliography on foundry sand practice.

## Education

Next on the agenda was G. J. Barker, University of Wisconsin, Madison, chairman of the Educational Division. He stated that a recent survey had showed that only half of the chapters had a local educational committee. This survey would indicate, Mr. Barker said, that if the division is to function effectively some way must be found for the development of closer relationship between it and local chapters. Division appointed one new committee this year to revise the Boy Scout Manual dealing with the foundry industry; the old manual presents the foundry in a rather unfavorable light.

## Gray Iron

W. W. Levi, Lynchburg Foundry Co., Radford, Va., spoke for the Gray Iron Division of which he is chairman. Gating and Risering Committee prepared an illustrated terminology chart, "Standard Names for Gates & Risers", which was given at the convention in tentative form. It is planned to modify it as required

with the expectation that the Society will issue it as a standard publication.

Research for the coming year will center around the continued investigation of mold-wall behavior and dilation characteristics. This will require determining the exact cause of anomalous behavior and accounting for all the shrinkage that occurs. Based on these findings, an attempt will be made to render green sand safer to use, and to recommend gating practices.

Also tentatively planned is a series of three lectures on solidification shrinkage and risering of cast iron and the release of information about a polishing procedure which promises to be useful in achieving rapid and yet high-quality samples of various graphite-containing ferrous materials.

Chairman Bornstein then called on W. D. McMillan, International Harvester Co., Chicago, chairman of the Malleable Division. Future research will center around mechanical properties and their relation to furnace atmospheres and annealability; reactions between the melt, furnace atmosphere, and the properties of the iron and their dependence on carbon, silicon, and temperature; affirmation of the relationship between pure gases and combustion gases; and foundry correlation.

He was followed by E. T. Kindt, Kindt-Collins Co., Cleveland, chairman of the Pattern Division. One of the topics planned for the 1953 convention is "Patterns for Shell Molding." After his regular report, Mr. Kindt stated that the pattern industry is diminishing by five per cent each year, and that the foundry industry will feel the impact of the situation.

## Sand Division

C. A. Sanders, American Colloid Co., Chicago, chairman of the Sand Division, reported next. In general, this big division was quite active during the past year, and its sessions at the convention were uniformly well attended.

Committee 8-C sent a questionnaire on core hardness to all members of the division; on the strength of the returns, it concluded additional work on hardness was required with further development of hardness testers. A similar questionnaire on core and mold washes will determine whether there is enough interest in the subject to warrant further work. Core stickiness is to be investigated by the committee.

Core Strengths Sub-committee has found an excellent correlation between transverse and tensile core strength.

Much work was done by the Flowability Committee, but the principal problem was to define exactly what is "flowability". The committee has been considering the possibility of establishing a visual series of specimens showing various voids that can be caused by varying degrees of flowability.

Grading & Fineness Committee has been considering two major problems: measuring particle size, and analyzing this information for foundry use. Green Sand Properties Committee has been extremely active, working on the reproducibility of sand tests, the permeability standard tube, and the sand rammer foundation. Other projects, including air set strength, district control laboratories, green hardness, and permeability, are under consideration for study and research during the coming year.

Mold Surface Committee, studying metal penetration has shown that high ferrostatic pressure is one of the important causes of this defect, even more important than temperature. The committee is also investigating the efficiency of core and mold washes in preventing penetration. A statistical report showed that five variables can affect metal penetration: time in mold; ramming; pressure; sand moisture; and sand distribution.

Committee 8-J held seven meetings during the year in an attempt to determine what high-temperature properties can be correlated with veining in gray iron. Temperature, core hardness, collapsibility, baking cycle, and ramming of green core were all found to have such a correlation. No correlation was found with any of the high-temperature properties of sand. At the next work meeting the committee plans to run tests on six sand mixtures that have veined and six that have not veined.

Committee 8-L reports that hot deformation is being correlated with unconfined expansion in order to establish its relation with scabbing. At the present time, different sands and different patterns are being checked. Work will continue at Cornell Uni-

**The Emerald Room of Chicago's Hotel Sherman was the scene of the 1952 meeting of the A.F.S. Technical Correlation Committee, held June 9. Standing, from left to right: G. J. Barker, W. W. Levi, W. R. Jaeschke, W. B. Scott, B. N. Ames, W. S. Pellini, R. V. Osborne, W. D. McMillan, E. T. Kindt, H. F. Scobie, H. F. Hardy, and W. H. Dashiell. Seated, from left to right: H. Bornstein, S. C. Massari, J. E. Foster, H. M. St. John, I. R. Wagner, W. W. Maloney, M. E. Annich, Hiram Brown, C. A. Sanders, W. N. Davis, C. B. Jenni, G. W. Johnson, and H. Rosenthal. Also present was James Thomson.**

versity. A progress report will be published in A.F.S. TRANSACTIONS, Vol. 60 (1953).

New committees now functioning include an Advisory Group formed of leading specialists to contribute their opinions when asked; Nomenclature & Terminology Committee, which is now studying all the words, phrases and terms used by the Sand Division and which will soon present a glossary of recommended definitions; Shell Molding Material Testing Committee; Effect of Carbonaceous Materials Committee, which will study seacoal, pitch, wood flour, hydrocarbons, etc; Malleable Foundry Materials Committee; Casting Defects Handbook Committee, to collect material for any revision of ANALYSIS OF CASTING DEFECTS; Sand Grain Distribution Sub-committee; and finally, the Special Ceramic Sub-committee.

Gray Iron and Sand Divisions have been working jointly on a symposium of sand reclamation; the Steel Division will also participate in this activity, which should be ready by 1953.

## Steel Division

Clyde B. Jenni, General Steel Castings Co., Eddystone, Pa., reported on the activities of the Steel Division. He is chairman. The Program & Papers Committee lined up nine papers presented at the convention, in addition to which there were two sessions with four papers devoted to a thorough discussion of statistical quality control. The Statistical Quality Control Committee is currently engaged in collecting information for a manual of this topic as applied to the foundry industry, and the four papers given at the convention will serve as a nucleus for the proposed publication.

Especially active was the Research Committee. Work done this past year was essentially three-fold: the development of a test specimen for evaluating hot tearing in steel castings; the use of this test casting at the American Steel Foundries Research Laboratory, East Chicago, Ind.; and the results of an extensive investigation using the test specimen at Burnside Steel Foundry Co., Chicago, Illinois.

Next phase of the problem will deal with the relationship between the results obtained with the hot tear test casting and the high-temperature properties of sands, such as hot strength at various temperature levels, hot collapsibility, hot deformation, density, and expansion and contraction.

There was no report from the Chemical Analysis Committee.

Although the Fluidity Testing Committee did not report either, a note from chairman H. F. Taylor, M.I.T., Cambridge, Mass., stated that the committee had decided that C. W. Briggs, Steel Founders' Society of America, Cleveland, should prepare a questionnaire on fluidity testing.

## Heat Transfer

W. S. Pellini, Naval Research Laboratory, Washington, D.C., reported for the Heat Transfer Committee. Mr. Pellini recently became chairman of this committee, as H. A. Schwartz, National Malleable & Steel Castings Co., Cleveland, who headed the committee since its organization in 1944, wished to be relieved of the responsibility.

He commented on the reliability and rapidity of the electric analog method over the bleed test, stating that the committee will undertake to develop an interpretive report on the work done thus far. The opinion of the committee is that the present work being reported annually at the A.F.S. Convention and in TRANSACTIONS should be continued to completion.

Reporting for the Plant & Plant Equipment Committee, James Thomson, Continental Foundry & Machine Co., East Chicago, Ind., reviewed the titles of papers given at the convention and stated that there was a move being made toward compiling them into a symposium on foundry molding machines.

This short but complete report was followed by that of the Plaster Mold Casting Committee, given by H. Rosenthal, Frankford Arsenal, Philadelphia, committee chairman. At its meetings this year the committee decided that a symposium should be organized and presented at some future convention. With this in mind, a tentative program was drawn up. In the future the committee intends to follow through on the organization of the symposium as rapidly as possible. Individual meetings will be held with each of the intended principles in order to discuss the scope of each contribution and to set a deadline for its completion.

Inasmuch as Robert Nieman, Whip-Mix Corp., Louisville, Ky., and chairman of the Precision Investment Casting Committee was not present, S. C. Massari read that report. The fifth and final section of the committee publication is scheduled to be finished by October; meanwhile the other sections are being reviewed and modernized.

Chairman of the Refractories Committee W. R. Jaeschke, Whiting Corp., Harvey, Ill., and Chairman of the Timestudy & Methods Committee M. E. Annich, American Brake Shoe Co., Mahwah, N. J., then delivered their respective reports, consisting principally of a review of their respective committees' activities before and during the Convention. Refractories presented seven papers at the Convention, Timestudy & Methods presented five.

## S & H & AP

In the absence of Chairman J. R. Allan, International Harvester Co., Chicago, W. N. Davis, S & H & AP director for the Society, delivered the Safety & Hygiene & Air Pollution Committee's report. Activated for less than a year, this committee has set up three sub-committees to cover welding, dust and ventilation, and air pollution. It has also planned a consulting service for industry, confined to answering specific questions by mail.

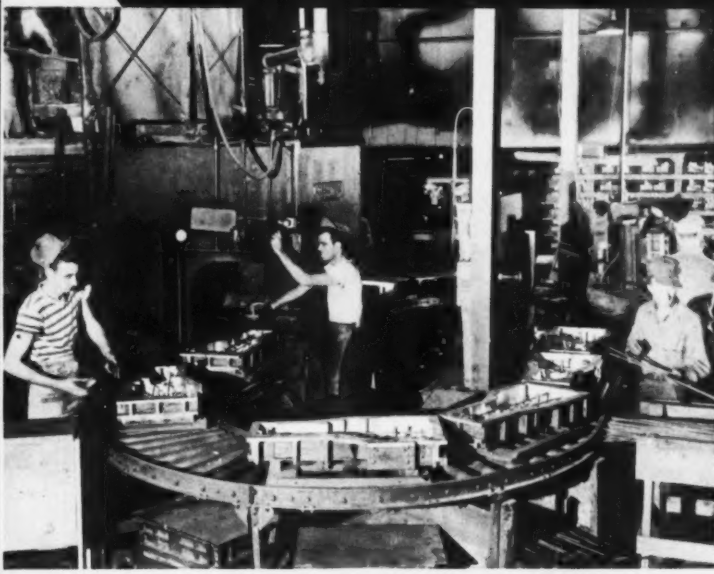
Business was then turned to the 1953 convention. Mr. Massari informed those present that it would be a non-exhibit convention held in Chicago, May 4-8. Deadline for papers will be December 15. Scheduling is as follows: Aluminum & Magnesium, Brass & Bronze, and Malleable papers first; General Interest papers next; and Gray Iron and Steel papers last.

Consensus was that committee meetings held during the convention suffered from diversity of other activities which seriously cut attendance. Division business meetings were felt to be worthwhile. There was no general opinion on the matter of using stenotype recorders at technical sessions, but several men offered objections to the system of recorders now in effect; Mr. Jaeschke pointed out that it not only takes a qualified man out of the discussion but also tends to make him late for other sessions.

Mr. Massari asked the divisions to check their present committees with an eye toward reducing dead wood, and requested chairmen of research committees to submit budgets at an early date. The meeting was then adjourned at 2:45 p.m.

## from the smallest...

A Champion CB-5 Core Blower in operation at General Malleable Corp., Waukesha, Wisconsin. The special stacking feet on the core dryers combined with the high production of the CB-5 permit maximum efficiency on this job . . . the blowing of port cores for diesel engine blocks.



## to the LARGEST

At the Golden Foundry Company, Columbus, Indiana, up to 180 large half-barrel cores are blown each hour on this high production coremaking unit with a Champion CB-400 Core Blower. Core boxes are rolled over on the Johnston and Jennings 612 Rollover Draw machine in the loop at the right. For small cores or for the very largest, you just can't beat a Champion for production and efficiency.

# there's a CHAMPION CORE BLOWER to meet every core room need!

From the small CB-5 to the huge CB-400, every Champion offers the same proven performance—the same unequalled production. Equipped with Champion's advanced design manual control, or available with Blo-Matic, the only fully automatic core blower cycle control, in the larger machines; each machine is adapted to a wide range of jobs. There's a size to meet *your* exact requirements!

| THE CHAMPION: | BLOWS CORES UP TO: |
|---|---|
| CB- 5 | 4½ lbs. |
| CB- 10 | 11 lbs. |
| CB- 12 | 30 lbs. |
| CB- 15 | 55 lbs. |
| CB- 18 | 125 lbs. |
| CB-400 | 300 lbs. |

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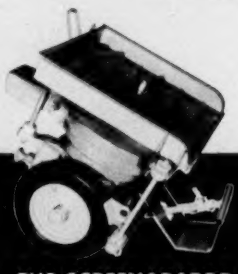

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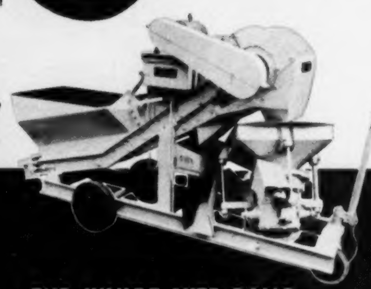

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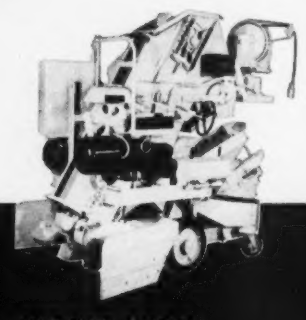
Thoroughly foundry tested and approved, the Junior Nite-Gang is a high capacity, highly portable machine designed for use with a front end loader. With a capacity of up to 40 tons of sand per hour, the Junior Nite-Gang provides complete screening and aeration with magnetic separation. Four rubber-tired wheels assure easy movement through the foundry.



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Self-loading and power propelled, the Nite-Gang offers the ultimate in floor sand preparation. Shakeout sand is loaded directly from the floor, blended, magnetically separated, screened, doubly aerated and discharged directly into windrow or pile ready for molding. This one-man operated machine offers capacities of up to 50 tons of completely prepared molding sand per hour.

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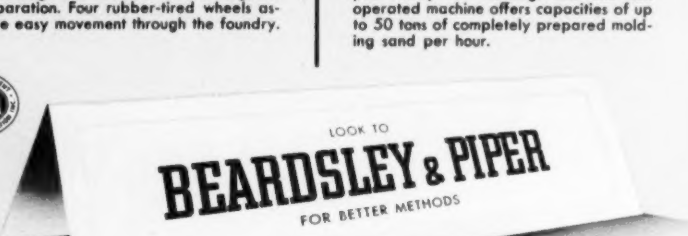


***For accurate green sand test results***

# Standardize, maintain testing equipment

**Molding with sand of poor properties is costly. To help foundries provide the best sand to the molders, the A.F.S. Green Sand Properties Committee has studied reproducibility of test results and standardization of equipment. Previously reported in part in *American Foundryman* and *Transactions*, the subject of standardization and maintenance of sand testing equipment is brought up to date in this article and availability of standard checking devices for measuring performance of testing equipment is brought out.**

▪ An instance of how standardization can help is to be found in one of the Committee's earlier reports. One sand sample was tested for green compression by nine laboratories, all tests being within 0.7 psi of the average. The tenth laboratory, having an improper rammer mounting, showed 1.7 psi lower than the average or 1 psi lower than any of the other laboratories. This condition was corrected by following the Committee's recommendations.

The cost of molding with sand of poor physical properties is high. Every effort must be put forth to provide sand to the molders that possesses the most desirable properties. One important step is to measure the physical properties of the sand with testing equipment which has been: (1) properly installed, (2) properly maintained, (3) properly calibrated, and (4) properly manned.

As an aid in keeping sand testing equipment in good operating condition, the following outline will be found useful:

## Balance and weights

1. Provide the laboratory with two balances. Use one balance for the more accurate weighing, such as moisture determinations and fineness. The other balance is to be used for the coarser weighing such as sand samples for permeability and strength tests.

2. Clean agate bearings with a cloth or soft brush to remove dirt.

3. If the balance is sluggish, examine cover over the center agate bearing. If the knife edge has scored the cover or side thrust plate, insert new hardened side thrust plates. Dull knife edges or chipped agates also cause loss of accuracy and should be replaced.

4. A balance for accurate sand test weighing should have not less than 20 mg sensitivity at 200 gram load, i.e., show one-fourth of a division unbalance for an added weight of 20 milligrams to one pan.

5. Always weigh with the balance swinging about three to eight divisions to either side of center.

6. Two sets of weights should be available. One for fine weighing, the other for coarse weighing.

**Fig. 1 . . . With special rammer base sand specimens are rammed the same regardless of foundation for rammer.**

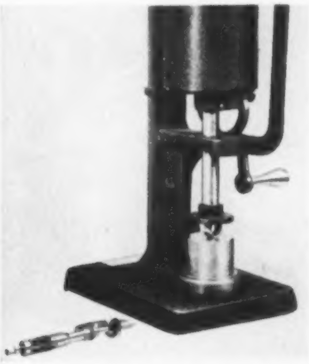


**Fig. 2 . . . Influence of rammer foundation is tested by degree of flattening of checking rings by three drops of ram.**

7. Weights wear and lose their original accuracy and, therefore, should be handled with care. Weights in daily use should be checked every three months.

8. One set of weights should be available that shows less than 20 mg error when any combination of weights is used to a total of 200 grams.

## Moisture teller

1. Rapid drying requires high air volume. Lubricate the motor according to instructions. Maintain or renew motor brushes (if used) and bearings to assure full fan speed.

2. Lubricate the pan holder bearing points and adjust so that the pan is in contact all around the top edge.

3. On older moisture tellers the air tube and inverted funnel are exposed. Be sure that the air tube is vertical and that both are firmly attached to the blower.

4. The compression ring of the

sample pans must press filter cloth down tight against bottom flange of the sample pans. Tighten compression rings by placing pan against a solid metal corner. Use a square-edged tool such as a punch. Hold tool at a 45 degree angle and drive punch with a hammer so as to dent top of compression ring into vertical wall of pan. Do this every two inches. On newer style pans this is not necessary since the ring is rolled in place.

5. The filter cloth in the pan must be sufficiently clean so that one can feel hot air flowing through an empty pan. Occasionally blow air with the mouth through the screen cloth from the bottom to remove dirt. If compressed air is used, hold it some distance away to avoid bulging or loosening the screen cloth.

6. Every three months check each pan against its counterweight. Put a 50 gram weight in the pan to equal the sample weight. Rub either the counterweight or the pan (whichever is heaviest) on a flat piece of emery cloth to balance the weights equally.

## Other moisture testing units

1. Check pressure or electrical moisture indicators at frequent intervals against the moisture teller or the oven method.

2. Keep the gasket in good condition on pressure type instruments. A leak may be detected by cautiously dipping in water while instrument is under pressure. Wipe carefully before opening. Tighten the gage gently if a leak is suspected at that point. Recalibration and major repairs are best done by the manufacturer of the equipment.

3. Electrical resistance moisture instruments should be serviced by the manufacturer aside from replacement of batteries, fuses, etc., as noted in the instructions.

4. Instructions for most moisture testing units involving drying give an average time for complete drying. However, it is well to dry and weigh for several increments of time to establish a safe minimum time for any particular sand or substance.

5. Where thermostats are provided, molding sands may be dried at temperatures as high as 325 F to save time. Core sand mixtures should be dried at 210-220 F to avoid loss of volatiles or gain in weight due to oxidation.

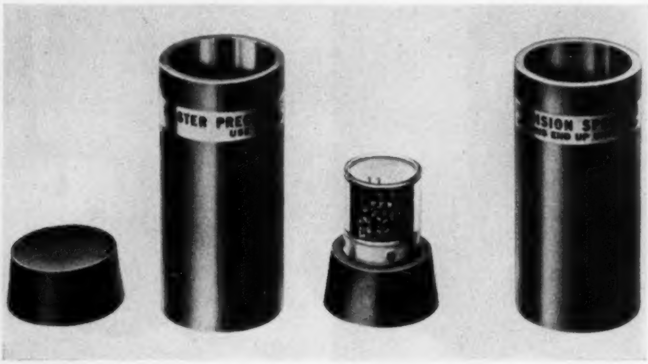



**Fig. 3 . . . Precision specimen tube at right is used for routine sand testing. Wear of precision tube is checked monthly by master tube at left. Master tube is protected when not in use by rubber stoppers, one fitted with desiccator.**

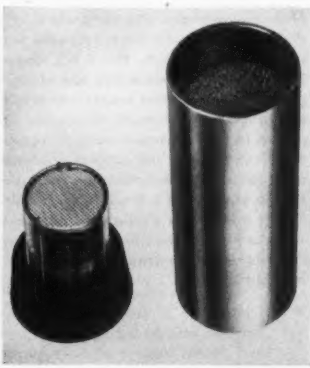


**Fig. 4 . . . Permeability standard is resin-bonded core. Rubber stoppers and desiccant protect core when not in use.**

## Sand rammer

1. Wipe moving parts clean and lubricate with SAE 10 oil weekly. Never use graphite on the rammer. Maintain the cam by welding tip or replacement to give a weight drop of 2 in. $\pm$ 0.005 in. Keep cam bearing and crosshead in condition so that cam makes full contact with the weight.

2. The special rammer base (Fig. 1) provides a standard reaction to the falling weight regardless of the type of support. This eliminates differences in mounting between laboratories. A test for the net energy of the rammer can be made with calibrated metal rings available from the manufacturer of the sand rammer. The amount these rings should be flattened is predetermined. Their use is illustrated in Fig. 2. A solid timber or concrete post forms a good rammer foundation and also isolates other test equipment from shock. It is possible to mount a rammer on too solid a foundation so that standard ramming energy is exceeded. Since this condition can seldom be duplicated, the use of the special base is advisable in any case.

3. Before testing, riddle the sand through a ¼-in. mesh screen and place in a covered container. Uncover the container only when taking sample.

4. Weigh out each sample of sand so that the rammed specimen will be within 1/32 in. of the standard 2 in. length.

5. Worn or rough specimen tubes resist ramming energy. Standard finish is 3-6 micro-inches RMS (Root Mean Square). Mark one end of the tube to be used until it no longer gives results equal to a master tube (Fig. 3) which is held in reserve for checking purposes.

6. See that rammer foot is not badly worn or loose. Shimming is not permissible since shims absorb energy.

7. When inserting tube and sample under rammer, lower weight gently to avoid imparting extra ramming. Weight raising lever gives better control in lowering weight.

8. Turn specimen tube ¼ turn with plunger resting on loose sand in specimen tube.

9. Take great care to turn the crank of the rammer the same each time. Make three separate turns of the cam, stopping at the 4 o'clock position each time. Do not jerk or turn the crank rapidly as this exerts extra pressure on specimen. A mod-

erate motion is easiest to duplicate.

10. Before specimen tube is inserted in rammer, wipe the plunger head and base for pedestal cup free of loose sand.

11. The accuracy and reproducibility of any subsequent sand test depends on the degree to which the specimen is rammed. Standard ramming is vital to the exchange of information on sand properties.

## Permeability meter

1. Unit must be level.
2. Drum must not rub on tank.
3. Zero of permeability dial must be level with water in manometer.

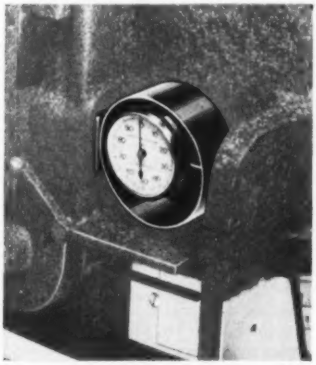


**Fig. 5 . . . Master proving ring can be used to check calibration of strength and deformation testing equipment.**

4. Have water level at mark.
5. Close the end of the specimen tube with stopper. Remove orifice and set tube in mercury. Pressure should read 10 cm. Drum must not settle visibly within 30 seconds.
6. Use a wet cloth to clean mercury of oxides, dust, and sand.
7. Check time of orifices, as directed by manufacturer's instructions, when they are used for control testing.
8. For best accuracy allow for temperature and barometric pressure in timing orifices and making standard stopwatch readings. Tables are available from the manufacturer.
9. Check all permeability machines daily with A.F.S. Permeability Standards (Fig. 4) for overall accuracy. These standards are available in four ranges—25, 50, 100, and 150 permeability. In case readings disagree, check over the above points and any other information contained in the manufacturer's instructions. Major repairs and recalibration should be done by the manufacturer. Should it become necessary to readjust automatic electric permeability meters, detailed directions are to be found in the manufacturer's instructions. These are available on request.
10. For all precise permeability testing, use stopwatch method.

## Sand strength machine

1. Weight must swing freely.
2. Test alignment of weight and pusher arm by passing a 9/16-in. rod through the bottom compression head holes. The two holes should line up when their inner faces are 2¾ in. apart. (equivalent to a 2 in. specimen and compression heads).
3. Level the unit. As a final check see that the weight hangs free and that the edge of the magnet pushing plate coincides with zero on the strength scales.
4. Use swivel compression heads.
5. Discard visibly worn stripping posts.
6. The rack and pinion gear should be dry and free of grit. Clean with steel brush. No lubrication should be used on either.
7. Insert 2 in. specimen and adjust length of switch reversing rod so that it clears the weight by 3/16 in. *Disconnect electric current during this adjustment.*
8. When hand loading, practice turning hand wheel so that 7.5 psi green compression strength reading is obtained in 15 seconds.
9. Use a 1-in. wide brush to clean strength machine after each test. Brush sand off gear quadrant between pusher arm and weight. Brush compression heads free of loose sand.
10. Wipe top of stripping post free of loose sand.
11. Use a master proving ring (Fig. 5) to check calibration of strength machines. This may be borrowed from sand strength machine manufacturer without charge.

## Green deformation accessory

1. Adjust the leaf spring bearing against the rack gear so that a friction load of ¼ lb is obtained as it is swung back and forth by hand. Where this is difficult, the spring may be replaced by a magnet available from the manufacturer, eliminating the need for adjustment.
2. Keep the fulcrum bearing well lubricated and free.
3. The friction of the maximum reading hand of the indicator must not be too great. A load of 2 oz should move this hand. In case this hand offers perceptible friction, remove bezel ring and glass so that spring load may be adjusted. A bezel with non-friction maximum hand may be secured from the manufacturer.
4. The master proving ring may be used to test a green deformation accessory for overall accuracy.

## Green sand committee

Members of the Green Sand Properties Committee who prepared the recommendations for standardization and maintenance of sand testing equipment are: *chairman,* Bradley H. Booth, Carpenter Bros., Inc., Milwaukee; *secretary,* Karl J. Jacobson, Griffin Wheel Co., Chicago; Harry W. Dietert, Harry W. Dietert Co., Detroit; Franklin P. Goettman, Standard Sand Co., Grand Haven, Mich.; Robert E. Morey, Naval Research Laboratory, Washington, D. C.; P. C. Rosenthal, University of Wisconsin, Madison, Wis.; H. C. Stone, Belle City Malleable Iron Co., Racine, Wis.; LeRoy E. Taylor, Goebig Mineral Supply Co., Chicago; Stewart A. Wick, New Jersey Silica Sand Co., Millville, N. J.; and D. C. Williams, Ohio State University, Columbus, Ohio.

**▶ *Conservation booklet gives in-plant program outline***

Standardization, simplification, and substitution are key factors in industrial conservation according to a bulletin just issued by the Defense Production Administration. Entitled "Industrial Conservation," the bulletin outlines a program for in-plant conservation and tells how to set it up. For the bulletin and additional information write to: Conservation Div., Defense Production Administration, Washington 25, D. C.

**▶ Bugas lecture on industry's responsibility now available**

■ Democracy is a great, though not an easy, idea according to J. S. Bugas, vice-president, Industrial Relations, Ford Motor Co., Dearborn, Mich., in his Charles Edgar Hoyt Annual Lecture presented during the recent International Foundry Congress. Entitled *"Industry's Responsibility to Youth,"* the lecture was highly acclaimed during the Congress. The lecture can be obtained from: American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Ill. Member price is 25¢, non-member 40¢.

***Who guards factory workers' health?***

# The industrial hygiene engineer

S. C. ROTHMANN / *Director, Industrial Hygiene Engineering Services, Deere & Co., Moline, Illinois*

**In its approach to "making the foundry a better place in which to work", management is awakening more and more to the realization that the Industrial Hygiene Engineer can make a most valuable contribution if given sufficient opportunity. He will assume the responsibility of maintaining the workers' environment in a condition conducive to good health, protecting them from discomforts and harmful exposures.**

▪ Industrial hygiene concerns itself primarily with the control or prevention of illnesses or worker discomforts. It involves not only the specific occupational diseases, but all the factors of the industrial environment that may have a detrimental effect upon the health, well being or efficiency of the employee.

The average industrial worker loses nine days a year because of illness—eight days for men and twelve for women. For all workers in the United States, the loss is over 350,000,000 days annually. The illnesses which contribute the most absenteeism are respiratory diseases. Diseases of the digestive system are the second highest group. There are numerous other absenteeism causes but sickness is one of the greatest contributing factors.

## Occupational disease

An occupational disease is an affliction which may be attributed to a specific industrial health hazard. A universally accepted definition is almost impossible to find. Different states incorporate different definitions into their Workmen's Compensation Statutes. Consequently, there are two schools of thought on the subject of occupational disease legislation and administration. One school holds that a disease must "arise out of and in the course of employment". The other school holds that "any disease contracted by a worker which arises out of employment, or out of incident of employment and yet not necessarily characteristic of employment," qualifies as such.

From a casual review of the various occupational disease compensation laws, one finds that the specified occupational diseases fall logically into seven major groups when classified according to their causative agent. Thus, under *dusts* are listed pneumoconioses and/or silicosis with or without tuberculosis, and asbestosis with or without tuberculosis; under *toxic metals* may be listed poisoning caused by lead, arsenic, cadmium, zinc (brass), manganese, radium, phosphorous and mercury; under *gases, vapors and fumes* come poisoning caused by nitrous fumes, carbon monoxide, hydrogen cyanide, wood alcohol, benzene, phenol, nitro and amino derivatives, gasoline, halogenated hydrocarbons, etc.; under *occupational skin hazards* are found chrome dermatitis or ulceration, inflammation or infection of the eyes or skin due to cutting compounds, oil, dusts, lubricants, gases, fumes or vapors; under *cancer* are ulceration of the skin or surface of the eye due to tar, pitch or bitumen; under *infectious agents* may be found such diseases as anthrax and glanders; and under *physical agents* may

**Hoods and exhaust system installed for the purpose of capturing airborne dust from stationary grinders. Fluorescent lights improve visibility.**

NOTE: All the opinions expressed in this article are those of the author and do not necessarily reflect the views of Deere & Co.

be listed radioactive substances, heat prostration, compressed air illness, and the like.

Occupational diseases, like accidents, are caused and don't just happen. Accidents, on the one hand, are capable of being isolated as to a specific time, place, causative agent, or fortuitous event. On the other hand, occupational diseases, due to their cumulative effects, variable onset, and peculiar manifestations, do not lend themselves as readily to the simple routine investigative techniques ordinarily employed in accident prevention. Regardless of these peculiar circumstances, employee complaints and dissatisfactions are known to be reduced to a minimum through early recognition or detection and control of the causes and effect of occupational diseases.

In the modern industrial plant, many production employees come into direct contact with a wide variety of toxic or irritating materials or substances which may, under certain conditions, cause occupational illnesses. These may be an integral part of a production process, such as a solvent used in the removing of grease or oil, an alkali for cleaning metal parts, or a lacquer or paint used in coating the finished product.

More frequently, however, materials contributing to the causation of occupational diseases are the toxic dusts, fumes, or gases which are formed during the process or operation. Since these substances are in many cases by-products of the process or have no value whatsoever, their presence is often unknown or their toxic properties overlooked.

Employee contacts with these materials may be direct, external skin contacts resulting from merely handling the substances. They may be internal due to the breathing of air contaminated by these materials. In any event, excessive exposure to any of these causative agents may produce symptoms or illness characteristic of the causative agent.

For example, carbon monoxide in air in concentrations exceeding 0.01 per cent by volume will cause headache and possibly nausea when breathed for a sufficiently long time, say eight hours. Sulfur dioxide in air in concentrations exceeding 0.001 per cent will cause marked irritation of the upper respiratory tract. Furthermore, it may cause the employee to be more readily susceptible to colds due to the chronic irritation of the tract. Secondary effects such as this may obviously be reflected in excessive absenteeism rates.

## Foundry health problems

Modern foundry progress has been characterized by constant advances in the more effective utilization of machines, material and manpower. The end result has been a spectacular improvement in foundry material handling methods, design and productive capacity of machines, lower costs, and other advantages which are well recognized. With regard to the third element, manpower, parallel although less far reaching advances have been forthcoming.

Some progress on a rather broad base has been made along the lines of improving environmental working conditions. These improvements we know now have already paid off by materially decreasing the occupational health and safety hazards of foundry workers. Over the past 30 years the incidence of silicosis, once considered the scourge of the industry, has been reduced to a noticeable extent as one of the rewards.

However, despite all these encouraging results, a great deal remains yet to be accomplished in order to appreciably reduce absenteeism and excessive labor turnover which continue as harassing problems in the foundry industry today. Furthermore, there still are a number of foundry employees who have not benefited to any great extent by the installation of locally exhaust-ventilated shakeouts, conveyorized pouring, better illumination and the host of other improvements which have accompanied mechanization.

These are the small group of men who work day in and day out in the

TABLE 1.

SUMMARIZED RESULTS OF A PRELIMINARY ENVIRONMENTAL ENGINEERING APPRAISAL OF THE POTENTIAL HAZARDS OF SOME TYPICAL FOUNDRY OPERATIONS

| FOUNDRY OPERATIONS | * POTENTIAL HAZARDS | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Raw Material Receiving & unloading scrap, sand, coke, etc. | | | x | | | | | x | | x | x | x | | | | x | x | | |
| Cupola Operation-Manual & mechanical, charging, etc. | x | x | x | x | x | | | x | x | | | | | | | | | | |
| Sand Preparation & Reconditioning mullers, riddlers, cutters. | | | x | | | | | x | | x | x | x | | | x | x | | x | x |
| Melting & Pouring-hand, bull ladle, etc. | x | x | x | x | x | x | | x | x | x | | x | x | | | x | x | | |
| Molding - Hand, bench, machine, sandslingers, etc. | | | x | | | | | | | x | | | | x | | x | x | x | x |
| Shakeout - Manual and Mechanical | x | | x | x | x | x | | x | x | x | x | | x | | x | x | x | x | x |
| Coremaking - Manual, bench or floor, mechanical | | | x | x | x | | x | x | | | x | | | x | x | x | | | |
| Casting Cleaning - Chipping, grinding, polishing, tumbling, blasting, etc. | | | x | | | | | | | x | | x | | | x | x | x | x | x |

* HAZARDS

1. Fire
2. Explosion
3. Dusts
4. Fumes
5. Gases
6. Toxicity (long continuous contact)
7. Toxicity (short duration)
8. Temperature extremes (hot, cold, outdoor seasonal, etc.)
9. Burns and/or corrosive action on skin, etc.
10. Fatigue, confined positions, repeated motion (nerve & muscle strain, etc.)
11. Humidity & dampness
12. Inadequate ventilation
13. Radiant energy, X-ray, ultra-violet, etc.
14. Dermatitis
15. Inadequate Illimination, glare, etc.
16. Poor housekeeping, over-crowding, inadequate floor area
17. Materials handling
18. Noise
19. Vibration

**Table 1 summarizes the results of a preliminary environmental engineering appraisal of the potential hazards of some typical foundry operations. Melting and pouring, shakeout, and coremaking are among the most dangerous.**

sand conveyor tunnels beneath the foundry floors. It is their job to shovel and sweep the sand that falls off the belt conveyors. In some foundries these men are employed in hooking out and sorting core rods from the molding sand as it passes on the conveyor belts. Here in these often inadequately ventilated, smoke and fume filled, poorly illuminated areas, the employees are exposed to most of the major foundry health hazards—carbon monoxide, iron and silica dust, noise, vibration and other physical agents such as heat, humidity and rapid temperature changes.

In fact, mechanization and some of the technical or scientific developments have, in a measure, introduced somewhat newer and more complex problems which are peculiar to these advancements. For example, the use of heat-reactive phenolic resin binders in the relatively new shell molding process brought with it a potential health hazard which may be attributed to the inhalation or skin contact with the resin dust, sand, vapors, gases, or fumes which are liberated in the bonding, oven curing, or pouring of molds. Incompletely cured two-step molding resins, especially the phenol formaldehyde which usually contains 5-10 per cent of the accelerator hexamethylenetetramine, is capable of causing dermatitis if suitable precautionary measures are not followed. Formaldehyde and phenol are both recognized as primary skin irritants and sensitizers, and hexamethylenetetramine is considered a skin sensitizer.

Excessive exposure of employees to the uncontrolled hazards in the foundry industry will, sooner or later, produce symptoms and eventually illness. In order to maintain the health of foundry workers on a high level and reduce absenteeism and labor turnover to a minimum, early detection and control of hazardous environmental exposures at their source are considered most essential. To intelligently approach the over-all complex problem of providing the foundry worker with a reasonably safe, healthful working environment requires the integrated efforts of a wide variety of professional skills and highly specialized techniques which are relatively new, having come into existence largely between the first and second World Wars. Most important of these technical skills are those of the nurse, physician, chemist and the newest member of this team—the industrial hygiene engineer.

## What he does

The industrial hygiene engineer is responsible for maintaining the worker's environment in a condition conducive to good health; in other words, keeping all harmful environmental exposures and discomforts away from the worker. These harmful conditions may include:

1. Exposure to such conditions as excessive concentrations of toxic dusts, fumes, mists, gases and vapors which may result in serious chronic or acute illness.
2. Exposure to high, low, or rapidly changing temperatures.
3. Inadequate provision for good general or local exhaust ventilation.
4. Exposure to excess humidity.
5. Exposure to harmful amounts of scattered radiant energy such as infrared, ultraviolet, roentgen rays and radium emanation.
6. Exposure to excessive noise and vibration.
7. Inadequate illumination, glare.
8. Poor housekeeping.
9. Abnormalities of air pressure.
10. Repeated motion, unnecessary fatigue, pressure, shock, etc.
11. Harmful materials handling methods—toxic or irritating chemicals contact.
12. Selective job placement based upon physical limitations.
13. Inadequate sanitary facilities.
14. Any other conditions which might adversely affect the health, morale, welfare and efficiency of the workers.

The industrial hygiene engineer's job consists primarily of making engineering appraisals of actual working conditions in the industrial environment. These appraisals are accomplished by means of two types of surveys or investigations: general preliminary visual precursory observations or inspection surveys; and specific quantitative engineering measurement evaluations.

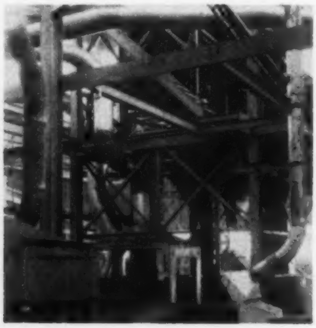
## Difference in surveys

The preliminary surveys are made for the purpose of familiarizing the engineer with the operations and processes, selecting the critical areas or problems in need of further quantitative study, and checking on the existence of and degree of compliance with federal state or local laws, codes, and regulations. Some summarized results of a typical preliminary environmental hazards appraisal survey of the foundry industry are given in Table 1.

In the follow-up or quantitative engineering surveys of the critical areas or specific problems, the studies or investigations in general include the following services:

1. Collection of air samples at the various specified locations previously selected from the preliminary surveys to determine the actual atmos-

**This single side-draft hood is used for exhausting the casting load-out area, eliminates another source of potential illness.**



**An effective method of locally exhaust ventilating a shakeout station.**

pheric concentration of toxic air contaminants existing in the form of dusts, vapors, gases, or fumes.

2. Studies of vibration, noise levels, illumination, and other physical conditions throughout the plant.

3. Engineering measurement or performance function testing of existing ventilation systems installed to control hazardous processes.

4. Reviewing all plans and specifications for new construction changes or alterations of existing structures where the possibility of potential health hazards might be a factor.

5. Studies into the causes and control of dermatitis and chemical or other irritations.

6. Indentification and control of applicable methods which might be used for the safe handling of new materials and substances, chemicals, and the like.

7. Advisory consultation with plant management, personnel, nurses, and other staff members concerning recommendations for control of health hazards associated with the various operations.

Complete environmental engineering evaluation reports are usually prepared and furnished to foundry management. These reports are based upon field and laboratory data regarding atmospheric concentrations of toxic substances and on the performance test data of installed ventilation control systems or other preventive measures. Through these reports foundry management is informed of the nature and magnitude of the potential health hazards encountered in their particular plant.

Fundamental as well as practical recommendations are furnished for the alleviation or elimination of the hazards by the adoption of any of the following standard corrective measures: isolating or enclosing the hazardous process; substitution of less toxic materials; installation of general or local exhaust ventilating systems; wet methods for allaying dust; or use of personal protective equipment such as respirators or gas masks and impervious protective clothing. A few examples are shown in the illustrations.

## Control or prevention

Standard methods for the control of air contaminants at the source are local exhaust ventilation, wet methods, and good housekeeping. Local exhaust ventilation consists of hoods or enclosures, air ducts, collectors, and exhausters or fans.

*Wet methods*, although limited to a small number of operations such as grinding, drilling and sweeping, are very effective if properly applied. The judicious use of water or other suitable wetting agents for operations producing dust will generally allay larger particulate matter, but there is some question as to whether or not wetting agents are capable of suppressing the smaller particles.

More good can be returned per dollar invested by *good housekeeping* than by any other single method. Abnormal air currents, shock and vibration, and the routine hustle and bustle of the foundry environment dislodge dusts and disperse them into the air. Ledges, floors, machines, overhead structures, and all horizontal projections, regardless of their size, should be cleaned thoroughly, routinely and frequently, using vacuum systems where practical and wet methods otherwise. As an added precaution, surfaces vacuum-cleaned routinely might also be wet-cleaned periodically.

The purpose of *dilution* or *general ventilation* is, of course, to dilute the air contaminant with fresh air so that by the time it is breathed by the worker its concentration has been reduced to a level which is neither objectionable nor harmful. Although ventilation at the source is considered far superior to dilution, much good can be derived by the intelligent use of windows, doors, roof ventilators, fans, chimney-stacks, and ejectors.

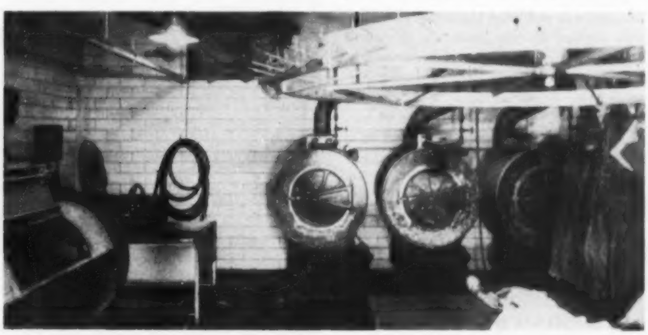
*Isolation* or *enclosure* of dust- or contaminant-producing operations or machines is another of the most effective means available for control. Workers directly responsible for the operation must be adequately protected with respiratory protective equipment, of course.

*Substitution* of non-toxic for toxic materials, where this will not interfere too seriously with the basic process or the quality of the product, is another one of the obvious although all-to-frequently overlooked practical solutions to many problems where atmospheric contamination is involved. A typical example of substitution is the use of steel shot for silica sand in the sandblasting operation.

*Respiratory protective devices*, either supplied air or air purifier type, can be used effectively on such intermittent operations as chipping and polishing, abrasive blasting, and welding. Under no circumstances should respiratory protection be used as a substitute for other more appropriate methods where the operation is continuous or the required wearing time excessive. The U. S. Bureau of Mines, Department of Interior, Washington, D. C., publishes a list of approved respirators which have been tested for various types of dust and specific uses.

*Maintenance of equipment, good housekeeping*, and *employee educa-*

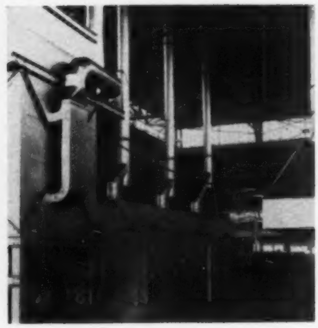
**Removal of smoke and gas from large castings by a ventilated cooling hood.**



**A foundry laundry is the nerve center of "Operation Cleanliness." Complete system includes washers, drying racks, and spin-dryer at left.**

Fresh air ducts supply a good general ventilation at these molding stations.

Employee relations as well as cleanliness improve with good locker rooms.



Excessive heat and fumes from core ovens are removed by this system.

*tion,* last and by all means not least, are most essential elements to be considered in any well-planned program aimed at the control or prevention of occupational illnesses. The intrinsic value of the elaborate or efficient exhaust ventilation system can easily be negated by the lack of proper routine preventive maintenance as is evidenced all too frequently by badly clogged or dented duct work, collapsed hoods, fan belt slippage, and collector bags which are loose or torn completely from their housing. Very often ill-fitting, poorly maintained respirators are worn as ornamental neckpieces which provide no respiratory protection whatsoever to the wearer.

Good housekeeping refers to the overall cleanliness of the entire foundry, and of necessity, must include everything from hygienic disposal of all waste materials to adequate cleaning methods, and general orderliness.

Employee education, in order to be most effective, must embody in its approach the *why* as well as the *how* of all precautionary measures. If an employee is sufficiently indoctrinated with regard to the need for prevention as well as to how these are attained, he will more than likely require less supervision.

Today, and in the years to come, preservation of the health of the foundry worker is of primary importance to the foundry industry—to management, to production, to the individual plant. In the accomplishment of this objective, the industrial hygiene engineer's mission might be likened to that of the public health engineer who is epidemiologically concerned with improving the quality of the milk and water we drink and in the prevention of communicable diseases. On the other hand, the industrial hygiene engineer is concerned, among other things, with improving the quality of the foundry air we breathe and in the prevention of diseases of adult life which might ordinarily be associated with the foundry industry.


## Acknowledgements

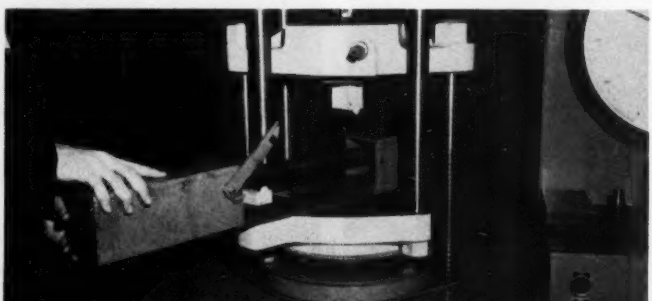
Grateful acknowledgement is made to the management of the various Deere & Co. plants for furnishing the photographs used in this article. Thanks are due the following individuals for their valuable suggestions and for reviewing the original manuscript: Dr. J. J. O'Halloran, Director, Deere & Co.'s Moline Medical Center; Mr. S. M. Lyman, Department of Industrial Relations and Personnel of Deere & Co., and Mr. W. K. Hunt, Chief Metallurgist of John Deere Harvester Works. Special thanks are due Dr. Emery B. Neff, Medical Consultant, Deere & Co., for his enthusiastic encouragement and willing cooperation.


## *now, there's an idea!*

■ An easily-built shield for enclosing arbitration bars during the transverse test protects men and equipment in the laboratory of Wells Manufacturing Co., Skokie, Ill. The simple device was constructed by the Maintenance Dept. after a flying piece of test bar chipped a nearby brick wall.

The shield, as described by Wayne Riggle, chemist at Wells, is based on a strip of steel with a small angle iron welded along opposite edges to create two small channels on the underside. Two boxes of welded plate slide onto either end of the base, guided by strips on the inside, bottom edges of the boxes which fit into the channels. A latch fastens the two halves of the shield together in use.

Rectangular holes in the base of the shield permit it to be placed over either the 12 or the 18-in. centers, standard on the testing machine.



Home-made shield keeps chunks of flying test bars from injuring lab personnel.

## New Safety Committee developing its phase of

# *Ten-Year S & H & AP program*

■ Formation of the Safety Committee inaugurates the third phase of the foundry's Safety & Hygiene & Air Pollution Program. Meeting July 31 in Chicago, the new committee reviewed existing foundry safety codes and discussed developing them into a safety manual, set up a safety training course for supervisory personnel, studied the script of a safety film to be developed for the foundry industry, discussed recommendations for booklets for specific foundry hazards, and planned a program for the 1953 A.F.S. Annual Convention.

The Hygiene Committee is writing a manual, *Foundry Dust Control*, which will give detailed information on dust prevention and abatement in foundries.

A manual on control and prevention of air pollution is in preparation by members of the Air Pollution Committee.

Members of the newly-formed Safety Committee are: *chairman*, John W. Young, International Harvester Co., Chicago; *secretary*, Wm. N. Davis, A.F.S. safety, hygiene, and air pollution director; E. O. Jones, Belle City Malleable Iron Co., Racine, Wis.; T. Kraklow, Deere & Co., Moline, Ill., S. E. Simpson, Caterpillar Tractor Co., Peoria, Ill.; George Milligan, Minneapolis - Moline Co., Minneapolis; E. J. Wallman, American Brake Shoe Co., Chicago; A. C. Hensel, Albion Malleable Iron Co., Albion, Mich.; Kenneth S. Hedges, General Motors Corp., Detroit; Leonard Cole, Crane Co., Chicago; B. A. Hindmarch, American Steel Foundries, Chicago; Harvey W. Johnsen, Ford Motor Co., Chicago; Walter Hanau, Fidelity & Casualty Co. of New York, Chicago; M. F. Biancardi, Allis-Chalmers Mfg. Co., Milwaukee; and J. D. Holtzapple, Continental Foundry & Machine Co., East Chicago, Ind.

### New air pollution bulletin

A 79-page bulletin reporting air pollution control measures taken in Los Angeles County, Calif., has been issued. Entitled "*Control of Metallurgical and Mineral Dusts and Fumes in Los Angeles County, Calif.*", the bulletin, Information Circular 7627, is available free of charge from the Bureau of Mines, U. S. Dept. of the Interior, Washington, D. C.

The information circular describes in detail the technical information developed by local groups in cooperation with the Bureau of Mines.

Due to meteorologic and topographic peculiarities of the Los Angeles County area, conditions are somewhat different there from other parts of the country. Whether or not methods of control developed in this area are economically feasible or necessary for all foundries in other parts of the country is questionable. However, this bulletin will help any foundry determine its own problems and provides information that will help in making decisions regarding installation of control equipment.

Information Circular 7627 describes developments in methods of testing and control, foundry practices, equipment, and procedures. It is recognized in the bulletin that the latter differ from plant to plant so that it is sometimes difficult from an operating standpoint to distinguish objectionable from acceptable practices.

Especially good information on fuels and temperatures is contained in the bulletin.

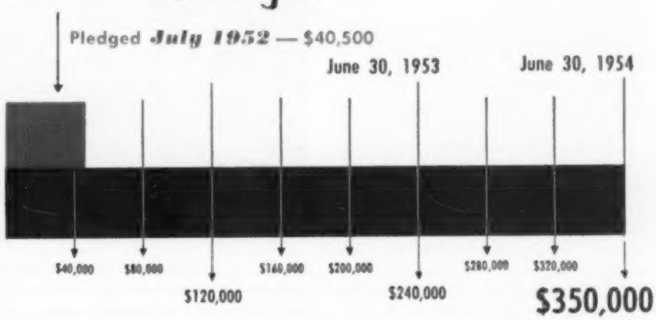
For non-ferrous foundries, sketches, pictures, and discussion give information on slag covers and sampling layouts. Good operating practices that give improved, economical operations, simultaneously reducing the amount of effluent are described.

Dust loadings of foundry effluents vary widely with operating procedure and it is recognized in this report that it is difficult to strike an average. Results of tests and analyses of combustion gases and particulate matter from three gray iron foundries typical of a large, a medium, and a small plant are given.

Tests were made on electric furnaces and open hearths in steel foundries. Operations and material given off are described along with recovery equipment installed.

At the end of the bulletin, the Los Angeles County Air Pollution Code is printed. Also included are tabulations of allowable limits for process emissions and a list of abbreviations, symbols, and conversion factors which are useful to any foundry investigating its own air pollution problems.

## S&H&AP fund goal



*For faster non-destructive testing*

# Semi-automatic x-ray equipment

DAVID GOODMAN / *General Electric Company, Milwaukee, Wis.*

**Quality control experts are continuously under pressure to conduct their testing and inspection programs with the least possible delay in production schedules. This article tells how the use of semi-automatic x-ray units coupled with automatic film developers makes speed and quality compatible.**

▪ It is becoming increasingly possible to attain both speed and quality when using semi-automatic x-ray equipment as part of quality control systems. Apparatus of this type permits the inspection of higher percentages of product runs and thus gives closer control over production processes. In addition, the human element is minimized.

Such equipment was installed recently at Fairchild Aircraft Corp., Hagerstown, Md., and has proven simple to operate, versatile, and dependable. Results are reproducible, and relatively unskilled operators can run the unit. Interpretation of the films, however, remains a job for trained personnel.

A modern cargo aircraft, such as the C-119 Packet, with a total of 1974 castings, presents a testing problem. Of the total castings, 1537 are aluminum alloy, 368 are magnesium alloy, and 69 are steel. These are classified according to the per cent of design load they will satisfactorily carry as determined by static tests to destruction; the amount of x-ray inspection is based on the results of these tests. Sampling tables are used to determine the actual quantity of castings to be radiographed after they are classified. Acceptance criteria relative to defect intensity and location is based on the radiographs for the units actually tested.

During one year's normal production, a total of 304,137 Class A, A-1, and A-2 castings were received, of which 21.66 per cent were actually radiographed. To handle this load, Fairchild procured a 220 kv x-ray unit with a jib boom and installed it in a 15-ft square lead-lined room with the controls located outside.

Pass boxes were used to transfer film to an x-ray darkroom equipped with manually operated developing units. Although production schedules were met, the need for personnel to evacuate the room whenever an exposure was made did not lend to the most efficient set-up and handling procedures. An average of 2.4 hours of tube time per 8 hour shift was realized with one film being exposed per shot.

But an increased volume of castings needing radiography resulted in a need for apparatus that would provide greater speed with no reduction in efficiency. An entirely new department was therefore laid out around a 140 kv semi-automatic radiography unit and an automatic film processor.

The 140 kv unit features automatic closing of the doors of a lead-

**Fig. 1 . . . Parts to be x-rayed are placed on racks near the x-ray unit, together with full information concerning their nature, use, and processing.**

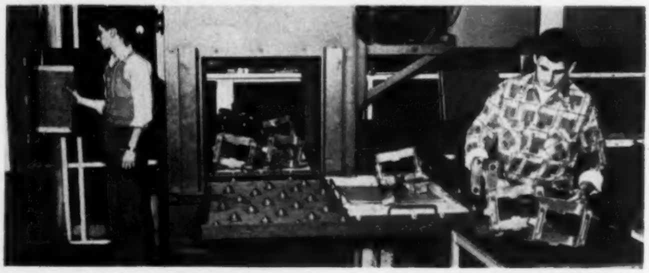


**Fig. 2 . . . Unexposed x-ray films are loaded into light-tight cassettes (or holders) and passed to the operators of the x-ray machine through the "out" door of a convenient pass box between rooms.**

Fig. 3 . . . Operator at left assembles groups of parts on trays on top of film holders. Man at right prepares to roll loaded tray into exposure chamber.

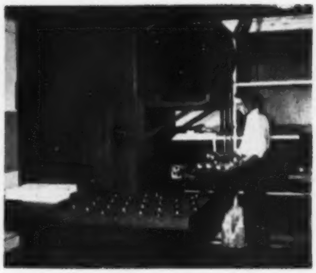


Fig. 4 . . . During exposure, doors of exposure chamber are closed to block radiation. Meanwhile, operator loads trays with more parts for x-ray.

Fig. 5 . . . Doors open automatically after exposure. As one tray is rolled out, another tray of castings is rolled in from the opposite side.

lined cabinet with pre-set exposure timing. Work is pushed into the cabinet on pre-set-up trays. Set-up is a continuous process because all personnel may continue working during exposure time.

In addition to a 100 per cent increase in the use of the tube, it is possible to expose two separate 14 x 17 in. films at the same time, thus doubling the amount radiographed. The exposed film-in-cassette is then sent to the developing room.

The automatic film developer puts films through the developing cycle in 60 minutes at the rate of one film per minute. All timing in developer, short-stop, fixer, washing, and drying is completely automatic to preset schedules and eliminates human error. Replenishment of solutions, temperature control, and circulation are also automatic.

Unit is designed to permit the viewing of urgent films while they are still wet. This is done by placing a part of the developing cycle in the lighted viewing room. The film begins its cycle in the darkroom, then emerges into the light on a conveyor. Installation is located for best handling efficiency with the receiving area only 10 ft from the radiographic area and the stores area also located about 10 ft away in the opposite direction.

As a result, Fairchild has eliminated a second shift operation of about 80 man-hours per week. It has doubled tube time per shift. Inwork time from receiving to stores has been lowered by 20 per cent. The original 220 kv unit is now being used for a research and development program.

Fig. 6 . . . After tray is removed, parts are taken off and stored. Film passes back to darkroom, is moved horizontally through each solution according to pre-set time cycle.

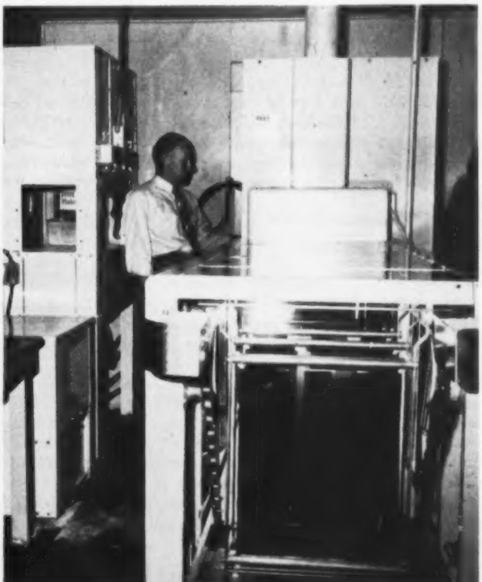


Fig. 7 . . . Having passed through solutions, the film is carried slowly through the drier on this chain belt. It emerges at the other end ready to be read and interpreted.

# Three-day technical meeting held at Lille by ***French Foundry Association***

■ The 25th Congress of the French Association Technique de Fonderie was held in May at Lille, France, under the presidency of Paul Muguet. Present were about 160 delegates, including representatives from Belgium, Great Britain, Holland, and Italy. Taken altogether, 16 papers were presented, of which four were exchange papers.

## First day

Following Mr. Muguet's address of welcome, the first paper was presented by J. Leonard of Belgium. Paper was titled, *"Porosity-Solidification Period of the Phosphide Eutectic"*. In it, he pointed out that porosity in cast iron carrying more than ¼ per cent phosphorus can be avoided by adjusting the carbon and silicon contents. Recommendations were that with one per cent phosphorus and 1.5, 2, and 3 per cent silicon, the corresponding carbon content should exceed the hypoeutectic by 0.15, 0.22, and 0.40 per cent, respectively. Machinability, Mr. Leonard said, decreases with increasing phosphide eutectic content, even if the iron shows the same Brinell hardness.

## Afternoon session

After lunch, technical sessions were resumed. Etienne Doat and Francois Danis read the paper, *"Correlation between Various Mechanical Tests on Normal Gray Irons"*, an introductory report on research being undertaken to provide proper data for gray iron specifications. This was followed by Mr. Sauterneau's paper, *"Use of Strain Gauges in the Steel Foundry"*, which showed how these instruments could be used where normal calculations are not practical.

Mr. H. de Leiris then read, *"Fractures in Service of Castings Submitted to Cyclic Stresses"*. Three basic points were brought out: conform rigidly to specified dimensions; use sound, dense metal and control this denseness by using methods appropriate to each class of castings; and insure the absence of local defects in stressed areas, reporting them when they do occur.

Professor le Rolland and Madame Plenard then presented a paper titled *"Considerations of the Modulus of Elasticity of Irons"*. The last paper given before recessing for the day was that of Jean Gelain: *"Remarks on Atmospheric Risers"*. Mr. Gelain gave a thoroughly practical contribution, using various types of normal foundry alloys.

## Second day

An early start (8:30) permitted five papers to be worked in before lunch. Leading off was *"Life of Clay in Molding Sands"* by Mr. Nicholas, followed by *"Corebinding Material"* by Mr. Meyer. The latter part of this second paper dealt with phenolic resins, a subject discussed in greater detail in the official exchange paper presented on behalf of the Institute of British Foundrymen which followed, written by G. L. Harbach and P. G. Pentz. Visual aid was provided by a table giving the properties of both French and English sands.

Then came the German exchange paper by Franz Roll, *"A Contribution to the Microscopic Examination of Corebinders"*. It detailed a technique using many chemicals which permits checking the consistency of various deliveries and the intimacy of mixing. The final paper in the session was *"Mold-drying by the Use of Portable Stoves"*, by Georges Ulmer and Maurice de Crop. Included was a full explanation of striking-back of moisture.

## Plant call after lunch

Lunch was followed by a visit to the works of Fives-Lille, a large plant operating both a steel and an iron foundry, the latter using the cement-sand process. During the evening, the Congress banquet was held at the Hotel Royale, presided over by Mr. Muguet. Speaker was Mr. Olivier, president of the North of France Foundry Owners Assn.

## Third day

Non-ferrous papers came into prominence on the concluding day. First came Henry Garnier with *"Quench Burns in Heat-treated Light-alloy Castings"*. This defect arises during heating at temperatures close to the melting point prior to quenching. The second paper was *"A Study of Light-alloy Casting Submitted to Static and Dynamic Stresses"*, by Louis Grand. It dealt with the performance of an automobile component, emphasizing the good service given by a heat-treated alloy containing Si, 9.5; Fe, less than 0.50; Mn, 0.38; and Mg, 0.26 per cent.

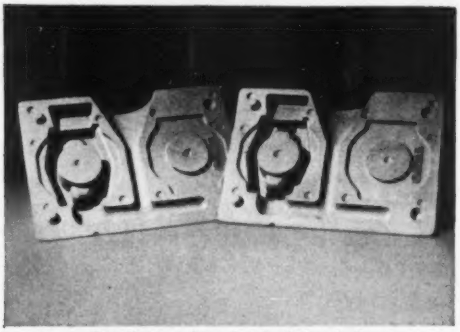
Next came the Italian exchange paper, *"Use of Gamma Rays for the Radiography of Light-alloy Castings"*, by Marco Robbo. This was followed by a long paper on *"Elimination of Aluminum from Tin Bronzes"* by G. Blanc and Pierre le Thomas. This quoted results of experiments using manganese dioxide, pure and diluted; potassium nitrate, again both pure and diluted; and a mixture of oxidizing agents. Energetic stirring, it was stressed, is essential.

The concluding paper was mainly practical, showing step-by-step actions in making a cast double-sided patternplate. The explanation was given by Bernard Faure, and was simplified by a colored film.

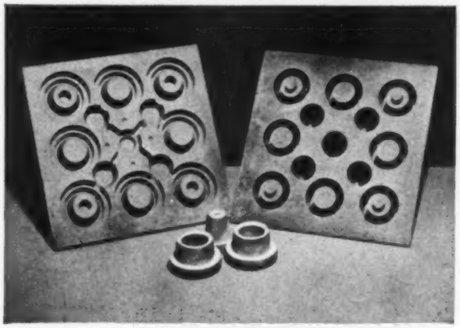
### ▶ *1953 International Congress Tour to Paris gathers momentum*

■ Requests are already coming in for information about the first official American party to visit an International Congress in Europe since 1929 (see July AMERICAN FOUNDRYMAN, page 46). Those wishing to receive all details on cost, itinerary, etc. (without obligation) should register *at once* with A.F.S. Secretary Wm. W. Maloney, American Foundrymen's Society, 616 S. Michigan Ave., Chicago 5, Illinois.

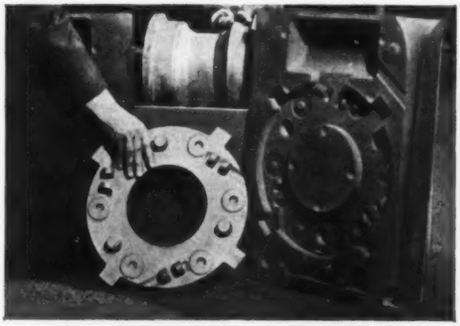
## Check these advantages of shell molding



Excellent surface finish of the shell



Castings with dimensional accuracy comparable to precision castings



Large castings possible with excellent finish requiring little or no clean up

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# 3 new products are among Monsanto's contributions to the foundry industry

You—like hundreds of other foundrymen—can look *first* to Monsanto for the latest developments, information, and know-how on Shell Molding . . . because Monsanto's search for new, improved products and processes for foundry use is conducted in a well-equipped foundry laboratory.

**3 New Research-Built Products**

Among several outstanding products developed by Monsanto are two new RESINOX phenolic resins that have been research-built for shell molding: RESINOX 0187A and RESINOX 0188. These two new resins supplement Monsanto's RESINOX 1128 (still the most used resin for shell molding) and Monsanto's phenolic and urea core binder resins.

Another new development from the Monsanto foundry laboratory is RESINOX Dust Suppressant A—which, when added to the resin-sand mixture, eliminates or greatly reduces dusting.

**New Booklet On Shell Molding Now Available**

Foundrymen, interested in Shell Molding (and resins for core binders), find Monsanto a ready source for the *latest* information and know-how . . . as well as the latest materials. Write for the new booklet which gives latest information on techniques and materials for shell molding. Just mail the handy coupon.

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At Worcester, Massachusetts, the Standard Foundry Company turns out a great percentage of the grey iron castings used in the Central New England area.

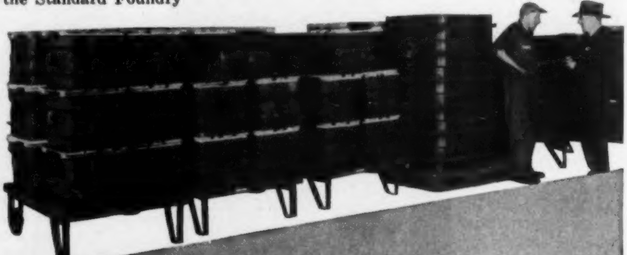
Several years ago Standard started a major plant expansion. The result is a merry-go-round operation making this jobbing foundry one of the most modern and efficient in the country. Five years ago Standard began using the various sizes of BS&B Foundry Flasks. Performance under continuous, extensive and hard usage daily had already convinced Standard of the economy and low maintenance costs of BS&B Flasks. With plant expansion they needed more flasks. Understandably, they turned to BS&B. Part of the BS&B Flasks delivered recently are pictured here. Different styles of BS&B Foundry Flasks for making small to large castings are in operation in the Standard Foundry

### For the tough jobs . . . the heavy jobs . . . It's the BS&B HEAVY DUTY Flask

All types of BS&B Foundry Flasks . . . light, medium and heavy . . . are in extensive use in the foundry industry. Regardless of type, you'll get a tailor made flask, built to the particular requirements of the operation —what you want and need. Your requirements may be for any or all of these types. If yours is a tough, heavy job, we'll recommend the HEAVY DUTY . . . the only flask manufactured combining these three features— (1) Welding of bearing strips, both inside and out; (2) Cast steel trunnions; (3) Cast steel pinlugs and clamp lugs.

**Write Foundry Flask Division 7AQ8 for FREE Handbook**

The BS&B Foundry Flask Handbook is a handy catalog containing useful foundry information ... includes easy-to-order system.



FOUNDRY BS&B FLASKS

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# Letters to the editor

**All letters of broad interest which do not violate A.F.S. policy or good taste are publishable. Write to Editor, American Foundryman, 616 S. Michigan Ave., Chicago 5, Ill. Letters must be signed but will be published anonymously on request.**

## Caught with our carbon down

■ On page 97 of the May issue of AMERICAN FOUNDRYMAN you reply to a question on stainless steel by stating: "Stainless steel generally should have an end carbon content of less than 0.03 per cent." Normally carbon runs much higher than this due to scrap conditions, alloying additions, and desire on the part of the foundryman.

Actually, the grade containing 0.03 per cent maximum carbon is known as extra low carbon stainless, demands a premium price, and is extremely difficult to produce even with an arc furnace. I don't know how the foundry will produce it in the induction furnace it intends to use. Carbon as low as this can usually be produced only by an oxygen blow in an arc furnace.

HIRAM BROWN, *Chief Metallurgist*
Solar Aircraft Co.
Des Moines, Iowa

*Thanks for catching our error. Standard compositions for corrosion resistant alloy steel castings call for carbon contents ranging from a maximum of 0.07 per cent for some types to as high as 0.50 for others. Heat resistant steel castings have carbon specifications ranging as high as 0.75 per cent.*

## Zinc recovery

■ For the recovery of zinc (Shop Talk, AMERICAN FOUNDRYMAN, May, page 97) the rotary crucible furnace manufactured by this company has been successfully used.

The furnace is fitted with a bottle-shaped crucible specially designed for the melting of swarf and metal powders with a minimum of oxidation loss. In action, the body of the crucible is tilted and both body and crucible rotate continuously. The rotary action, coupled with the special shape of the crucible, insures uniform and rapid heating because the charge is constantly being turned over and brought into contact with the hot crucible wall. The cover remains stationary, the oil or gas burner firing downwards through it.

This furnace is also giving excellent results on the recovery of zinc from residues such as galvanizers' ash, as well as the reclaiming of brass and bronze swarf, metal powers, and skimmings. Yield is high, melting loss low, and the cost reasonable. The temperature remains well below the boiling point of zinc and thus a condenser is not required. The unit is self-contained and requires only fuel and air supply.

Although we cannot at present claim to separate zinc from iron in hard zinc, this unique furnace is an extremely efficient melting unit for recovering the metallic zinc content of zinc residues.

MORGAN CRUCIBLE CO. LTD.
London, England

## Salutes copper-base alloy book

■ Just received my copy of the newly published COPPER-BASE ALLOYS FOUNDRY PRACTICES. The American Foundrymen's Society certainly did a grand job.

I hope the Society will be able to place one in the hands of every person in the non-ferrous field, because this book surely will give them their money's worth.

WM. ROMANOFF,
*V.P. and Tech. Supt.*
H. Kramer & Co.
Chicago

*Some 21 leaders in the copper-base alloys field combined their talents and experience to revise and expand this new A.F.S. publication.*

## Anybody doing it?

■ We wonder if the A.F.S. Time Study & Methods Committee is doing anything in the field of methods-time measurement. You are no doubt familiar with the book entitled *Methods-Time Measurement* published by McGraw-Hill and we are anxious to know what foundries might be using this method to establish standards. Our interest is in foundries where the standards may be used to establish the performance level of people on direct measurements as well as, for instance, maintenance people that may be considered under an indirect incentive plan.

The majority of our production workers participate in an incentive bonus plan where all of the standards have been established by stop watch observations. It is our feeling, however, that there may be a growing resistance to the use of a stop watch for purpose of establishing standards, particularly because of the judgment involved in obtaining the proper rating of the performance. Therefore, we believe that the methods-time measurement approach could become very valuable in such instances because it appears to be more acceptable to the workmen.

Any information you can furnish on methods-time measurement will be greatly appreciated.

*Resident Manager*
Gray Iron Foundry

*Foundries using methods-time measurement or anything akin to it are urged to report their experiences to the chairman of the Time Study & Methods Committee, M. E. Annich, Supt. of Standards, American Brake Shoe Co., Mahwah, N.J. All replies will be kept confidential unless permission to publish accompanies reply.*

## Corrects erroneous report

■ On page 71 of the June issue of AMERICAN FOUNDRYMAN, I find a brief review of the paper, "*Pneumatic Reclamation for Foundry Sands*," which I presented at the recent A.F.S. Convention. The review doesn't tell the whole story so I want to get several important points across in this letter.

First, while the paper discussed batch unit operations for reclaiming core and molding sands, it definitely stated that these were but preliminary to the subsequent development of a continuous unit with much better production capacity per unit of time. The commercial installations will all be continuous units with a minimum rating of one ton per hour for reclaiming for re-use in cores and as high as six tons per hour for reclaiming for re-use in molding sand mixtures.

Second, the tabulated data on the operating costs of an existing commercial installation showed that it was costing the foundry $2.991 per hour to operate the unit including overhead, depreciation, etc., and at a rate of three tons per hour they were reclaiming sand at $.997 per ton. This is far from the $4 figure your reviewer reported.

CLIFFORD E. WENNINGER, *Dev. Eng.*
National Engineering Co.
Chicago

*Thanks for correcting a case of slipshod reporting.*

## Synthetic or compounded

■ Ever since about 1922 when foundrymen began to use other than naturally bonded sand mixtures the adjective "synthetic" has been used to describe the man-made sand mixtures. In many industries synthetic refers to a substitute material or in the minds of many persons an ersatz product. We hear of synthetic resins but manufacturers of such materials prefer to call them by their more appropriate name, condensation products. Synthetic as applied to sand mixtures does not appear to adequately describe what occurs when other than naturally-bonded sand mixtures are produced.

A hint as to a more appropriate title for these man-made sand mixtures is

*continued on page 96*

# "OH MY ACHIN' BACK"

## at $ Per Day Per Back

### *Cut Non-Productive Time with Ajax Lo-Veyors*

One of your *few remaining ways* to pare down your rising costs is to cut your materials handling costs. Today, more than ever before, non-productive time and overhead is of vital concern.
Ajax Lo-Veyors are helping foundrymen speed up sand handling between departments, between machines and between operations.
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# abstracts

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## Cupola improvements

**A209**..."Improvements of Cupola Furnaces", M. G. Joly, *Fonderie*, February 1952, pp. 2805-2809. (in French)

Balancing the air blasts in the classical type cupola furnace is discussed. The process of re-heating is described using the furnace; the advantages for thus preheating the air are enumerated. Tests, made for the purpose of enriching air with oxygen, were carried out by investigators. Many of the suggested improvements are easy to make and inexpensive. Diagrams and illustrations are included.

## Box-less mold process

**A210**.."The Sand Block Procedure," R. Weidner, *Geisserei*, Vol. 39, No. 2, January 24, 1952, pp. 25-29. (in German)

The advantages are described of the sand-block procedure, in which the casting takes place in a box-less mold, the box being removed after the preparation of the sand mold so that the same box can be used in a succession of similar operations. Tables are given illustrating the time required in the elementary operations involved, and the efficiency of the method.

## Ductile iron status

**A211**.."Status of Ductile Cast Iron in Founding", A. P. Gagnebin, *Fonderie Belge*, January 1952, pp. 2-8. (in French)

In a report to the International Foundry Congress at Brussels, 1951, the principal subject is a material known as ductile cast iron, nodular cast iron, or cast iron with spheroidal cast iron. The properties, specifications, advantages, and effects due to adding certain elements are discussed. Graphs and photomicrographs are given.

## Cored forging, pressing

**A212**.. "Does New Process Challenge Foundries?", L. Frame, *Canadian Metals*, Vol. 15, No. 3, March 1952, pp. 28-29.

Cored forging and pressing processes offer the foundry industry a new tool. Valve and plumbing fixtures may in a few minutes be "hot pressed" from raw material to finished product. The advantages over casting and solid forging include greatly reduced machining time, no waste and few rejects; parts of higher tensile strength may be made smaller and lighter, and complexity of design is limited only by the die maker. The parts are superior as to smoothness and close tolerances.

## Permanent mold castings

**A213**.."A Review of Factors Influencing the Use of Permanent Mold Castings", *Precious Metal Molding*, Vol. 10, No. 3, March 1952, pp. 66-68.

Many designers are uninformed as to the potential advantages of permanent mold techniques. Advantages as well as limitations are inherent in the casting technique involved. Prior to the use of permanent molding techniques, the following factors should be considered: (1) annual production, (2) dimensional tolerances required, (3) physical and metallurgical requirements, (4) casting size, and (5) surface finish required.

## Induction hardening

**A214**.."Induction Hardening of Malleable Cast Iron", A. Ruhenbeck, *Geisserei*, Vol. 39, No. 5, March 6, 1952, pp. 103-107. (in German)

Induction surface hardening of malleable cast iron parts is recommended to German foundrymen by whom the procedure has been little used so far. The following advantages of the new method over the usual hardening procedures are emphasized: the convenience of use on a conveyor line, and the high quality of the product.

## Degassing with lithium

**A215**.."Degassing with Lithium," *Metal Industry*, Vol. 80, No. 10, March 7, 1952, pp. 191-192.

Castings of monel, nickel bronze, leaded bronze, and nickel silver, considered difficult to produce due to gas porosity, may be cast using lithium as a degassing agent. Besides degassing, this treatment produces remarkable improvements in the grain refinement and mechanical strength of copper-base alloys. Best average additions have been found to be 0.005%.

## Better investment castings

**A216**.."Investment Casting Quality Tied to Gating, Mold Turbulence", R. L. Wood and D. von Ludwig, *Iron Age*, Vol. 169, No. 8, February 21, 1952, pp. 93-96.

Study and analysis of factors affecting alloys used in investment casting was undertaken at Arwood Precision Casting Co., Brooklyn, N. Y. Alloys studied were stainless 410, SAE 4140, 52100, 4130, 303, 304 stainless and 440C. Properties studied were pouring temperatures, flask temperature, and effects of environment turbulence and heat treatment techniques. It was recommended that 52100, the most fluid of ferrous alloys, not be used for impact loaded designs. Flask temperature does not affect hardenability. Gating was designed for mold turbulence study. Diagrams and graphs are included.

## Gases in bronze

**A217**.."The Gases in Bronze", W. T. Pell-Walpole, *Fonderie Belge*, January 1952, pp. 9-11; and February 1952, pp. 32-35. (in French)

In the first of a series of articles the chemical effects of gases on bronze are described. Equations are given for the reactions of oxygen with copper, zinc, tin, copper and phosphorus, and tin and phosphorus; the reduction of water to hydrogen by copper or tin; and a few reactions of sulfur dioxide, carbon monoxide and carbon dioxide.

In the second article the effect of the gaseous hydrogen in bronze is considered at some length. In cooling, the hydrogen is freed from solution resulting in porosity, bad micro structure, segregation of phases, and other undesirable features. Chemical and physical effects of oxygen, sulfur, gas combinations, and gas introduced during the casting operations are all discussed.

## Sands for cement molding

**A218**.."Preparation of Cement Molding Sands", H. Gries, *Giesserei*, Vol. 39, No. 6, March 20, 1952, pp. 121-127. (in German)

Technical and economic advantages of mixtures of pure quartz sand and cement, considered as a special case of synthetic molding sands, are discussed. A study of the mechanical properties and of the permeability to gases of the mixture, as a function of its composition, is made, with special reference to the old sand component coming from previous operations. Various methods of preparation of the mixture are described, the advantages of the new pneumatic procedure being especially emphasized.

## Sand analysis

**A219**.."Analysis of Sand before Introduction into an Intermittent Grinder", *Fonderie*, Vol. 72, January 1952, pp. 2779-2783. (in French)

The quality of sand prepared by a grinder depends upon an accurate analysis of its constituents. The proportions of the constituents and the amount of sand treated should be constant. Different techniques of volumetric analysis which for apparatuses of small capacity give accurate enough results, are diagrammed and discussed. Some automatically performed gravimetric methods are given. The latter are more accurate but of prohibitive cost. One method is diagrammed. Choice of an apparatus is made by means of feeding the grinders for each kind of sand.

# book reviews

## Metal cleaning bibliography

*Metal Cleaning Bibliographical Abstracts* . . 1950 Supplement, prepared by Jay C. Harris. 32 pp. Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3. $1.00. (1951).

This 1950 Supplement brings the original bibliography, published in 1949, up to date and contains 170 bibliographical abstracts, including 89 additional references for the period from 1932 to 1948 and 81 new references for 1949-50.

References are arranged by year and author and cover all phases of metal surface conditions and cleaning.

## Diecasting safety

*A Safety Manual for the Diecasting Industry* . . 44 pp. plus appendixes. Looseleaf, clothbound ring binder. Published by American Die Casting Institute, Inc., 366 Madison Ave., New York 17, N. Y. $5.00. (1951).

Written by die casters specializing in safety procedures, this volume is aimed at guiding small and medium-sized plants in formulating safety policies and methods. An attempt is made to present material so as to permit the small plant to adopt the procedures outlined. Profusely illustrated and containing photographs of safety devices and reference data, this work is designed for use by supervisors and foremen as an operating tool.

## Fundamental foundry practice

*Foundry Science* . . by Dr. Harry A. Schwartz. 286 pp. Illustrated with charts and diagrams. Published by Pitman Publishing Corp., New York, N. Y. $6.50. (1950).

Newest volume in the Pitman Metallurgy Series, *Foundry Science* is designed to interpret foundry science to the industrial technologist and the foundry student. In simplified form, the text describes metallurgical operations in actual foundry sequence, thus all fundamental scientific concepts related to a given operation are assembled in one place. Text is also useful as a refresher on theory for the foundry engineer.

## High temperature metallurgy

*Metals at High Temperatures* . . by Frances H. Clark. 372 pp. Illustrated with photographs, charts and graphs. Indexed. Published by Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y. $7.00. (1950).

Claimed by its publishers to be the first American book on the new high-temperature metallurgy, this volume is a compilation of the most recent data on the subject. Designed primarily to cover heat resistant alloys and special alloy steels, the text also includes properties of aluminum, lead and magnesium alloys. Sections cover plasticity of metals, creep, test methods and current manufacturing methods for heat resistant alloys.

Essential tabular data gives properties of latest high-temperature alloys.

## Oxygen cutting

*Oxygen Cutting* . . by George V. Slottman and Edward H. Roper. 407 pp. Illustrated with charts, graphs and photographs. Indexed. Published by the McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y. $6.50. (1951).

This volume presents a detailed background of the theory and practice of oxygen cutting of metals and covers such recent advances as flame machining and scrafing, underwater cutting, rock drilling, electronic tracers for cutting machines, and developments in heavy cutting. Chapters are devoted to metal temperature, plant facilities, hand and machine cutting, types of machines, multiple and stack cutting, etc., providing a basic outline of oxygen cutting and its practical applications.

## Castings solidification

*The Solidification of Castings* . . by R. W. Ruddle. 116 pp. Illustrated. Indexed. Published by the British Institute of Metals, 4 Grosvenor Gardens, London, S. W. 1, England. $2.00. (1950).

This volume, No. 7 in BIM's Monograph and Report Series, presents a review of literature on solidification and methods of controlling it, divided into two sections. The first deals with application of scientific principles to casting and ingot production, including directional solidification, and the second section is concerned with a fundamental study of solidification rates of castings and ingots.

## Non-ferrous melting

*Symposium on Non-Ferrous Metal Melting and Casting of Ingots for Working* . . 166 pp. indexed. Illustrated with photographs, color photographs, charts and diagrams. Published by British Institute of Metals, 4 Grosvenor Gardens, London. $2.50.

Text comprises six papers presented in a symposium held at the 1949 Annual Meeting of the British Institute of Metals. Papers deal with Melting and Casting of Non-Ferrous Metals, Production of Refined Copper Shapes, Melting and Casting Aluminum Bronze Ingots for Subsequent Working, Application of Flux Degassing to Commercially Cast Phosphor Bronze, Melting and Casting of Brass, and Melting and Casting of Nickel Silver—all by British authorities.

## Chemical analysis of metals

*1950 Book of ASTM Methods for Chemical Analysis of Metals* . . 476 pp. Indexed. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Clothbound: $6.50. Interleaved copies: $9.00. (1950).

The 1950 Book replaces the 1946 edition of this same work and is greatly expanded to include many new testing procedures approved by ASTM Committee E-3.

Volume covers 39 extensive standards for chemical analysis of ferrous and nonferrous metals, ferro-alloys; nickel-chromium-iron alloys, nickel and nickel-copper alloys, copper and copper-base alloys, aluminum and aluminum-base alloys, magnesium and magnesium-base alloys, tin, lead, antimony and their alloys, silver solders and zinc. Also included is a detailed index that lists each method under at least two broad headings—material covered and substance being determined.

Besides recommended practices for apparatus and reagents, photometric analysis, and for designating significant places in specified limiting values, there are sampling methods on steel and iron, ferrous alloys, wrought non-ferrous alloys, and cast non-ferrous metals and alloys.

Limited number of copies are available at slightly higher cost with interleaved blank pages for recording notes on special methods and procedures.

## Phase changes

*Phase transformations in Solids* . . 660 pp. Illustrated. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. $9.50. (1951)

In August, 1948, a symposium was held at Cornell University which brought together scientists from many different fields who had a common interest in the fundamental phenomena accompanying phase changes. This book is made up of papers presented at the symposium, plus discussions of them.

In the interest of continuity, some discussions are included in the text of the papers to which they relate; others appear separately. The material is of 3 types: a theoretical-physical group, a group dealing with non-metals, and a group dealing with metals. There is almost no overlapping of subject matter, and each paper forms a complete unit for independent reading.

Typical papers cover general theory; crystallization as a cooperative phenomenon; nucleation theory; solid-liquid transition in argon; transitions in glass; transformations in pure metals; order-disorder transitions in metal alloys; and the eutectoid reaction. Book is sponsored by the Committee on Solids, Division of Physical Science, National Research Council.

## Gray iron welding, joining

*Welding, Joining and Cutting of Gray Iron* . . by C. O. Burgess. 37 pp. plus bibliography. Illustrated. Published by Gray Iron Founders' Society, Inc., 210 National City—East 6th Bldg., Cleveland 14. $1.50.

Written by GIFS Technical Director C. O. Burgess, this volume outlines new processes and techniques for welding, joining and cutting of gray iron and tells how the advantages of welded fabrication can be extended to gray iron components. Described in detail are engineering considerations in using welding processes or a combination of welding processes. Covered are general considerations in welding gray iron, arc welding processes, brazing, special joining processes, and torch and arc cutting.

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Dings All-Welded Cooler Operating Lifting Magnet.

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# 4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

**1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY** in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

**2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . .** *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

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# ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

## How CHROMIUM BRIQUETS Increase Hardness and Strength of Cast Iron

Chromium briquets are made especially for the addition of chromium to cast iron in the cupola. The amount added may vary from small percentages up to as high as 15 per cent.

### Function of Chromium in Cast Iron

Chromium is added to cast iron for the purpose of refining the grain and stabilizing the combined carbon content, thus increasing strength, hardness, and resistance to wear and abrasion. Even very small additions of chromium have a decided effect, and as little as 0.25 to 0.50 per cent will yield a great improvement in iron used for resistance to wear. A typical application is in automotive cylinder castings, particularly in heavy-duty truck and tractor work.

The stabilizing and refining effect of chromium is particularly useful to foundrymen producing castings of medium to heavy section. The slow cooling of such castings often results in weak, open-grained iron. Chromium in amounts up to 1.00 per cent will increase the stability of the structure of the castings and help to offset the effect of slow cooling in the mold.

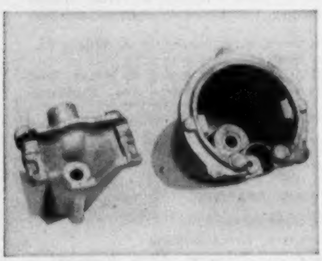

*Fig. 1—These low-chromium iron castings, which are parts for a die-casting machine, are machinable, uniformly hard, and resistant to the effect of high temperature.*

### High-Temperature Service

The strong effect of chromium in stabilizing the structure of gray iron has made its use in iron subjected to high temperatures almost universal. Chromium in the range of 0.75 to 1.25 per cent greatly reduces the growth and warping that occur in unalloyed irons as the result of repeated heating and cooling. Chromium cast irons in this range of chromium content may be inoculated with silicon alloys to decrease the tendency to chill and, also, to assist in maintaining machinability. Such irons are adaptable to various high-temperature applications, such as melting pots, die-casting machine parts, grate bars, etc.

### How Binder Protects Chromium

For the addition of chromium to cast iron, ELECTROMET produces briquets containing exactly 2 lb. of chromium each. The alloy is protected by a refractory binder, which has a high melting point and, therefore, helps to prevent oxidation of the chromium until it is melted and delivered to the crucible of the cupola.

The recovery of chromium from "EM" briquets is thus uniformly high, normally above 85 per cent, and it is easy to obtain the desired final chromium content. This is of particular importance when the limitations of hardness and machinability for a casting demand close chemical control.

### Typical Briquet-Iron Mixture

The use of "EM" chromium briquets in the production of cast iron of low chromium content is shown in the table below.


*Fig. 2—"EM" chromium briquets are hexagonal in shape, and each contains exactly 2 lb. of chromium. Notched briquets (right), which are easy to break in half, can be purchased for use when 1 lb. additions of chromium are desired.*

The mixture given is for a medium-strength iron used for castings in which resistance to wear or heat is required.

### Booklet Available

Typical briquet mixtures for other types of irons are given in the booklet "Briquetted Alloys for the Iron Foundry Industry." This booklet also contains information about "EM" briquets of silicon, silicomanganese, and ferromanganese. If you would like a copy, free of charge, simply write to the address given above or to the ELECTROMET office nearest to you. Offices are in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York and San Francisco. In Canada: Welland, Ontario.



**Typical Briquet Mixture for Low-Chromium Iron**

| Base Charge | | Material Charged | Alloys in Charge Material: Silicon | | Manganese | | Chromium | |
|---|---|---|---|---|---|---|---|---|
| Per Cent | Lb. | | Per Cent | Lb. | Per Cent | Lb. | Per Cent | Lb. |
| 20.0 | 200 | Pig Iron | 2.25 | 4.50 | 0.85 | 1.70 | — | — |
| 30.0 | 300 | Return Scrap | 2.00 | 6.00 | 0.75 | 2.25 | 0.57 | 1.71 |
| 30.0 | 300 | Purchased Scrap | 2.00 | 6.00 | 0.65 | 1.95 | — | — |
| 20.0 | 200 | Steel Scrap | 0.10 | 0.20 | 0.45 | 0.90 | — | — |
| 100.0% | 1,000 lb. | Total Base Charge | | 16.70 lb. | | 6.80 lb. | | 1.71 lb. |
| Briquets Required | | 5 Silicon Briquets | | 5.00 | | — | | — |
| | | 1 Silicomanganese | | 0.50 | | 2.00 | | — |
| | | 2½ Chromium Briquets | | — | | — | | 5.00 |
| | | Total Alloys Charged | | 22.20 lb. Si or 2.22% Si | | 8.80 lb. Mn or 0.88% Mn | | 6.71 lb. Cr or 0.67% Cr |
| | | Melting Recovery | | x .90 | | x .85 | | x .85 |
| | | Final Iron Analysis | | 2.00% Si | | 0.75% Mn | | 0.57% Cr |

# American Foundrymen's Society introduces

## New Company Members

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### ▶ British and American founders exchange annual greetings

■ In this year's exchange of greetings and good wishes between the American Foundrymen's Society and the Institute of British Foundrymen, G. A. Lillieqvist, American Steel Foundries, East Chicago, Ind., conveyed the message from A.F.S. President Walter L. Seelbach, Superior Foundry, Inc., Cleveland, and Secretary-Treasurer Wm. W. Maloney, to the IBF annual conference. Mr. Lillieqvist also presented the official exchange paper from the Society to IBF entitled *"The Role of the Research Foundry Unit."*

Cyril J. Dadswell, English Steel Corp., Sheffield, new president of IBF, and Tom Makemson, IBF secretary, replied to the A.F.S.

To the American Foundrymen's Society, Greetings and Best Wishes:

"The Institute of British Foundrymen and its members attending the Annual Conference at Buxton, June 10-13, were most gratified to receive the greetings and good wishes and the inspiring message from the American Foundrymen's Society, and on their behalf we express the grateful thanks of the Institute of British Foundrymen. We were very glad to welcome the bearer of the message, Mr. G. A. Lillieqvist, and we wish to place on record our gratitude to Mr. Lillieqvist for the paper which he presented to the Conference, and we also place on record our thanks to the A.F.S. for presenting this paper.

"Finally, we take this opportunity of saying how grateful we are to the American Foundrymen's Society for the facilities offered to many of our members in connection with the recent International Foundry Congress, and the Study Tours which were arranged in connection with it.

"Like you we look forward to meeting again at the 1953 International Congress in Paris."

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The photograph below shows the molding line, hoppers and supports which were also fabricated and installed by the Liberty Engineering Division. Other KIRK & BLUM systems are found in this same well known manufacturer's plant.

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DUST CONTROL SYSTEMS

# chapternews

Unidentified but cheerful group of foundrymen were snapped at the Central Ohio Chapter's eighth annual picnic, held at the Columbus Riding Club on June 28. In all, 200 were present to relax, indulge in athletic contests, or just drink beer. Highlight of the afternoon was an excellent roast beef dinner followed by a floor show and drawing of door prizes.

## Chicago melting school

ROY W. SCHROEDER
*University of Illinois (Navy Pier)*

Outstanding success of Chicago Chapter's Melting School, this year's educational lecture series, has resulted in a number of requests for details. Here is the program that brought out an enrollment of 525 men representing 102 companies, and a total attendance of 1300 at the nine meetings.

Planning started in March 1951 at the conclusion of the Sand School when those attending were asked what type of school they wanted next year. Result was the Melting School designed to reach the men in the shop and improve their knowledge of furnaces, fuels, metals, and refractories. Separate sessions were scheduled for steel, gray iron, malleable, and non-ferrous foundrymen, all on different nights, thus permitting attendance at any or all sessions. The program called for steel meetings on March 10, 17, and 24, gray iron on March 11 and 18, malleable on March 12 and 19, and non-ferrous on March 13 and 20.

The program was outlined early in the fall in a meeting of the Educational Committee, the Lecture Course Committee, and the Board of Directors. Subsequent meetings were held which included the chapter chairman, vice-chairman, and secretary, the chairman and secretary of the Educational Committee, the chairman and secretary of the Lecture Course Committee, and the group leader in charge of each of the four fields of foundry interest; detailed program outlines for each field were studied and developed by this group.

With plans all laid and arrangements made to use facilities of the University of Illinois at Chicago's Navy Pier, publicity was started under direction of the chairmen and secretaries of the Educational Committee and the Lecture Course Committee. All Chicago-area foundries, all Chicago chapter members, and chairmen of chapters in the Central States received a mimeographed program mailed March 4. Items announcing the program were placed in AMERICAN FOUNDRYMAN. The mimeographed program was followed by a letter from the chairman of the Educational Committee enclosing a poster giving program details and costs (season ticket $1.00, single session 50¢), a blank and instructions for enrolling, and the information that those who attended four or more meetings would receive a Certificate of Attendance while those who attended seven or more would receive additional special recognition.

Enrollment forms sent to plants provided space for listing names of all in the plant who desired to attend, along with a column for checking types of sessions in which they were interested. If no response was received from a plant, phone calls and personal contact brought in the forms and registrants. As a result of these personal contacts, new members joined the Society.

Final enrollment figures show that 97 attended four or more meetings, 40 of these attending seven or more sessions. The latter received their choice of A.F.S. publications made available through the generosity of a number of companies in the Chicago Chapter area.

Most of the sessions were the lecture and discussion type with one to three speakers. A panel of experienced operators, including the speakers, was present at all meetings to participate in the question and answer period. Highlight of the Melting School was the steel panel which concluded the series. At this meeting panel members sat at a long table. Behind each man on a blackboard was his name, position, company, and type of furnace used. Questions could thus be directed to the proper panel member and answers were heard by all as a hand microphone was passed up and down the table. The procedure was so successful it is expected to be followed in most future meetings.

Melting School attendants were given the opportunity to suggest topics of interest for the 1953 program. A mimeographed form was provided. Voting, in order of decreasing preference, was for:

Central Michigan Chapter's eighth and final monthly meeting found these men assembled in the lounge (left to right): Guest Speaker J. S. Schumacher, Hill & Griffith Co., Cincinnati; Vice-Chairman A. J. Smith, Michigan State College; Chairman T. T. Lloyd, Albion Malleable Iron Co.; Chairman-Elect D. W. Boyd, Engineering Castings Co., Marshall; Director P. B. Coombs, Riverside Foundry & Galvanizing Co., Kalamazoo; and Secretary-Treasurer R. K. Moore, Foundries Materials Co., Coldwater. Mr. Schumacher spoke on "Fool Proof Sand".

These are the men instrumental in producing the 30-minute narrated slide film, "A Career in Metal"—Northwestern Pennsylvania Chapter's Educational Committee. Left to right, Roger Griswold, Erie Malleable Iron Co., Erie; John Clarke, General Electric Co., Erie; Joseph Shuffstall, National-Erie Co., Div. of Bucyrus Erie Corp., Erie; and Earl M. Strick, chairman, Erie Malleable Iron Co. Film is for showing in schools, PTA meetings, etc.

In action at Western New York's annual picnic are catcher Bill McQuillan; umpire Hank Hedden; and batter Fred Goerke, the new chapter director. (Photo by M. E. Taublieb)

Henry Howell, Howell Foundry Co., president for 1951-1952, delivers farewell address to the Southern California Chapter at the June 13 meeting. (Photo by Ken Sheckler)

Just what he always wanted! Bill Gilbert, Buckeye Foundry Co., Cincinnati, presents a golf prize to John Sheley, Black-Clawson Co., Hamilton, Ohio, while Burt A. Genthe officiates at the microphone. Prize was one awarded in the golf contest staged at the Cincinnati Chapter's annual party and picnic June 9. Mr. Genthe is the new chapter chairman.

special casting methods (shell molding, centrifugal casting, investment casting, permanent mold casting, etc.); gating and risering; defective castings; plant layout and production methods; and nodular iron.

At the 1953 sessions, time will be set aside for consideration of safety measures related to each phase of foundry practice under discussion.

Heading the group which planned the Melting School was Prof. Roy W. Schroeder, University of Illinois (Navy Pier), chairman of the Chicago Chapter Educational Committee. Other members of the committee are: Wm. D. Danks, Howard Foundry Co., Fred H. Dix, Lane Technical High School, E. H. Pritchard, Western Materials Co., E. E. Schwantes, International Harvester Co., and E. J. Walsh, Natl. Fdry. Assn.

Group leaders directly responsible for each field of foundry interest were: steel, Clyde Wyman, Burnside Steel Foundry Co.; gray iron, Harold G. Haines, Howard Foundry Co.; malleable, Cecil F. Semrau, Illinois Malleable Iron Co.; and non-ferrous, Fred L. Riddell, H. Kramer & Co.

Melting school speakers were: Harold Bunte, Commonwealth Edison Co., Chicago; Charles W. Vokac, Whiting Corp., Harvey, Ill.; W. C. McCosh, National Carbon Div., Union Carbide & Carbon Corp., Chicago; C. E. Grisby, General Refractories, Philadelphia, Pa., S. J. McGinty, Firegan Sales, Chicago; H. Rassbach, Electro Metallurgical Co., Div. of Union Carbide & Carbon Corp.; G. W. Johnson, Vanadium Corp. of America, Chicago; L. H. Hahn, Sivyer Steel Casting Co., Chicago; Paul Gowens, Fahralloy Co., Harvey, Ill.; J. Harrod, U. S. Steel Corp., Chicago; Cizma, National Malleable & Steel Castings Co., Chicago; and Herman Meyer, Pettibone Mulliken Corp.

Others were: B. P. Mulcahy, Fuel Research Laboratory, Inc., Indianapolis; Ray A. Witschey, A. P. Green Firebrick Co., Chicago; John P. Holt, Basic Refractories, Inc., Gary, Ind.; C. F. Semrau, Illinois Malleable Iron Co., Chicago; Frank Czapski, Chicago Malleable Casting Co., Chicago; B. C. Yearley, National Malleable & Steel Castings Co., Chicago; W. D. McMillan, International Harvester Co., Chicago; H. W. Maack, Crane Co., Chicago; Wm. G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.; Walter R. Jaeschke, Whiting Corp.; H. M. St. John, Crane Co., and Walter Bonsack, Christiansen Corp., Chicago.

## Central Michigan

R. H. DOBBINS
*Albion Malleable Iron Co.*

Eighth and final monthly meeting for 1952 was held on May 20 at the Kalamazoo Country Club, Kalamazoo, Mich. Arrangements were made by Palmer Coombs, Riverside Foundry & Galvanizing Co. of Kalamazoo.

Guest speaker was J. S. Schumacher, Hill & Griffith Co., Cincinnati, who

spoke on "*Fool Proof Sand*". (EDITOR'S NOTE: See page 54, June 1952 AMERICAN FOUNDRYMAN.)

A complete slate of new officers was selected, and outgoing chairman Thomas T. Lloyd, Albion Malleable Iron Co., Albion, Mich., gave a summary of the accomplishments of the chapter during the past year. He pointed out that in addition to the regular meetings, the chapter had held four special meetings, including an annual picnic, a Christmas party, a visit to Battle Creek Vocational School to observe the progress of the chapter-fostered Foundry Practice group, and a chapter-sponsored Cupola School. He lauded the chapter for its increase in active membership from 102 to 161, greatest percentage increase among all chapters during July 1, 1951-June 30, 1952.

## Chesapeake

C. A. ROBECK
*Gibson & Kirk Co.*

The chapter assembled on June 14 for a Crab Feast and Steamboat Trip down the Chesapeake Bay, leaving Baltimore at 11 a.m. to go as far as the new Chesapeake Bay Bridge, which is nearing completion.

Crowd numbered 300, and included visitors from other A.F.S. chapters as well as from the Reading and Conestoga Foundrymen's Associations. Steamed crabs, crab cakes, crab soup, hot dogs, hot and cold beef sandwiches, cold cuts, beer, and coffee made up the menu, which was available buffet style on a "take as much as you want" basis. The boat unloaded its cargo of gorged and happy foundrymen in Baltimore at 6 p.m.

## Ontario

F. J. RUTHERFORD
*Refractories Engineering & Supplies*

The chapter Educational Committee, under W. A. Jones, Canadian Westinghouse Co. Ltd., Hamilton, J. M. Hughes, John T. Hepburn Ltd., Toronto, and J. Perkins, Ford Motor Co. of Canada Ltd., Windsor, has drafted a three-year course to start this fall.

Course will be one of the biggest educational schemes ever undertaken by any A.F.S. chapter, with classes in Brantford, Hamilton, Toronto, and later in Windsor and London. It will comprise elementary work the first year, practical the second, and advanced the third.

In another meeting plans were almost completed for the 10th Annual Picnic which will be held September 12 and 13. Site is at Fern Cottage Resort in Atherley, Ontario.

## Michigan

A. J. RUMELY JR.
*La Porte Foundry Co.*

June 27 saw the chapter officers in conclave with members of the Program and Entertainment Committees at Plymouth Country Club. Topic: events for the coming year.

Entertainment Committee announced that the annual picnic will be held at Plymouth Country Club on September 13. Program includes golf, horseshoes, softball, and other games. A show will be presented in the evening.

Program Committee decided to hold one meeting on shell molding and split half of the remaining six meetings into ferrous and non-ferrous groups. First meeting will be at St. Joseph on October 13; next five will be at South Bend in the Morris Park Country Club. Program will conclude at Elkhart next April.

## Cincinnati

D. J. PUSACK
*Cincinnati Milling Machine Co.*

Annual golf party and picnic on June 9 was attended by over 250 foundrymen from the Cincinnati area. A complete program of golf, baseball, horseshoes, and buffet supper was enjoyed at Summit Hills Country Club, Fort Mitchell, Kentucky. First prize in golfing went to the new vice-chairman, William Oberhelman.

Officers elected for the coming season are: *chairman*, Burt A. Genthe, S. Obermayer Co., Cincinnati; *vice-chairman*, William Oberhelman, Oberhelman-Ritter Foundry Co., Cincinnati; *secretary*, Harry F. Greek, Hill & Griffith Co., Cincinnati; *treasurer*, Harry R. Schick, Ranson & Orr Co., Cincinnati. New directors are Ernest V. Piazza, Whiting Corp., Cincinnati; E. J. James, Dayton Oil Co., Dayton; Phil Pearson, Williamson & Co., Cincinnati; and Robert Ritter, Oberhelman-Ritter Foundry Co.

## Central Ohio

W. H. WHITE
*Jackson Iron & Steel Co.*

Eighth annual picnic, held at the Columbus Riding Club on June 28, attracted about 200 foundrymen. The afternoon was spent in relaxing, talking over foundry problems, and drinking beer.

An excellent roast beef dinner was served at 6 p.m., followed by drawing for door prizes provided by local foundry suppliers. A floor show ended the evening, which broke up about 9 p.m. because of the unseasonable heat.

## Eastern New York

E. S. LAWRENCE
*General Electric Co.*

Encouraged by the bright and sunny day, 83 foundrymen attended the outing held June 14 at Endries Willowbrook Inn. Refreshments and contests of athletic skill were on the agenda, including golf chipping, horseshoe pitching, and a giant baseball game wherein selected stalwarts from eight foundries battled to a 15-all tie.

Just before dinner local "water dowser" Ray Willey, General Electric Co., demonstrated his art of locating underground streams from a contour map of the area. After dinner the members duly installed officers for the coming

**Series of three photographs show members of the Chesapeake Chapter relaxing during their recent boat trip and crab feast down Chesapeake Bay, ostensibly to look at a new bridge. Left, past national president E. W. Horlebein, Gibson & Kirk Co., Baltimore, and other distinguished foundrymen take things easy on the poop deck. Center, Al Smith displays amused and friendly skepticism at the narrative spun by W. S. Crisp, Gibson & Kirk Co. Right, Ed Horlebein warns against taking in too much beer on such a hot afternoon.**

year: *chairman*, Leigh Townley, Adirondack Steel Co., Watervliet, N. Y.; *vice-chairman*, Edwin S. Lawrence, General Electric Co., Schenectady, N. Y.; and *secretary-treasurer*, William C. Stevenson, Rensselaer Valve Co., Troy, N. Y.

## Northeastern Ohio

R. D. WALTER
*Archer-Daniels-Midland Co.*

Recent election of officers for the year 1952-1953 resulted in the following: *president*, Frank C. Cech, Cleveland Trade School; *vice-president*, S. E. Kelly, Eberhard Mfg. Co., Div. of Eastern Malleable Iron Co.; *secretary*, R. D. Walter, Archer-Daniels-Midland Co.; and *treasurer*, F. R. Fleig, Smith Facing & Supply Co. All are located in Cleveland.

Directors nominated for 3-year terms are J. F. Roth, Cleveland Standard Pattern Works; Edwin Bremer, *Foundry*, Cleveland; W. H. Redhead, Lake City Malleable Co., Cleveland; Edward Kreager, Henry Furnace Co., Medina; and E. C. Jeter, Ford Cleveland Foundry. Directors for one year are Retiring President Gilbert J. Nock, Nock Fire Brick Co., Cleveland; and H. J. Trenkamp, Ohio Foundry Co., Cleveland, appointed to complete the unexpired term of S. E. Kelly.

**Joe Kremyler, General Electric Co., Schenectady, gets off a chip shot in the golf contest at Eastern New York's annual picnic outing. (Photo by Howard Bodwell)**

## Southern California

A. A. GRANT
*A. Grant & Company*

Ninth and last regular meeting was held June 13 at Rodger Young Auditorium, Los Angeles. Traditionally, the last meeting honors past officers of the chapter, and welcomes the new officers for the next series of meetings. The chapter had a most successful year, due to the excellent leadership of Henry W. Howell, Howell Foundry Co.,

Los Nietos, Calif., and his officers, as well as the fine cooperation of its members. Chapter exceeded the goal for membership by seven, and now has a total of 295. It has exceeded its pledge to the A.F.S. Building Fund by over $200, and in addition has paid up in two years instead of the three allotted.

New officers for the year 1952-53 are Harold G. Pagenkopp, Angelus Pattern Works, Huntington Park, *president;* Hubert Chappie, National Supply

**Shown taking a breather are some of the directors and committeemen of the Ontario Chapter, who met at Fern Cottage, Atherley, Ontario, to thrash out future plans.**

Company, Torrance, *vice-president;* Charles Gregg, Gregg Iron Foundry, El Monte, *secretary;* and William Baud, Mechanical Foundries Div., Food Machinery & Chemical Co., Vernon, *treasurer.* New directors are Robert W. Wagner, National Brass Works, Inc.; Paul Koenig, Mastercraft Pattern Co.; Anthony Tuzzolino, Overton Foundry; and Alfred A. Grant, Grant & Company.

## Central Michigan

J. T. EHMAN
*Albion Malleable Iron Co.*

Annual outing was held June 14 at the Coldwater Country Club, Coldwater, Mich. Program for this highlight of the year's activities was handled by D. J. Strong, Foundries Materials Co., Coldwater, and John Wolf, Midwest Foundries, Coldwater.

Following sports events and contests, drawings for door prizes were held with over 100 members taking home presents ranging from cigarette lighters to picnic sets, contributed by industrial sponsors of the outing.

## Western New York

M. E. TAUBLIEB
*Frederic B. Stevens, Inc.*

June 28 was the date of the 15th annual picnic, held this year at Sturm's Grove, Bowmansville, N. Y. Activities for the afternoon included baseball, horseshoes, and cards. About 300 were present; most of the foundries in the area were well represented. A great number of prizes were given away.

## *products*

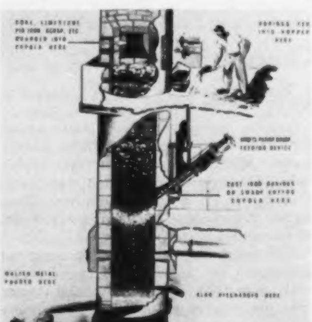
*continued from page 17*

terial to storage, truck, or another conveyor belt. The gondola unloader—one man empties 1 50-ton car in about three hours—rests on the sides of the car and is traversed from end to end by hand, buckets being lowered about 6 in. each

trip to pick up load in successive layers. Box car unloader has automatically extendable conveyor belt which permits unloader to pick up at either end of the car while discharging material outside. Unloaders are powered by electricity, but gasoline power is available. *MFI, Inc.*

### 809 Melting borings

Designed to recover millions of tons of cast iron, a new process permits melting cast iron borings in foundry cupolas. Reclamation is efficiently carried out under normal foundry conditions. Process consists of feeding the borings into the mouth of a chute at platform level and forcibly introducing them through refractory wall of the cupola just above the melting zone. No admixture of flux or other binder

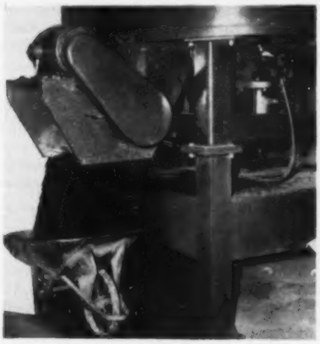


is needed, and no alterations to the normal method of operating the cupola. The $1\frac{1}{4}$-in. mesh at the entrance to the chute rejects oversize material. Flow at chute entrance is assisted by an electric vibrator. Principal difference between this method and previous methods lies in the device to introduce the borings. Intermittent strokes of an injector ram (incorporated in the entry duct) forces the borings among the charge. Metallic additions of 25 per cent have been accom-

plished. There is practically no loss in the melting process, and results indicate an increase in melting rate with a reduced coke-to-iron ratio due to improved thermal efficiency. Process is fully protected; licenses for its use will be granted. *Crofts Limited.*

### 810 Fast aerator

Latest of a line of aerators features a 50 per cent increase in discharge time over previous models. In effect, sand may now be discharged through the aerator just



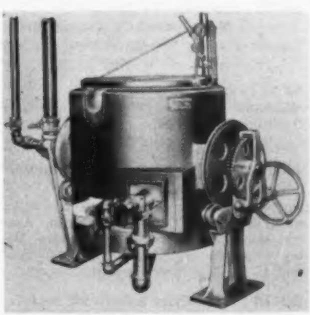
as fast as it is received from the mixer. Aerator is attached directly to the mixer discharge and consists of a drum shaft mounted on sealed bearings. Old aerators of the maker can be adapted by installing a rotor conversion unit consisting of new combing bars mounted on a hexagonal shaft. *National Engineering Co.*

### 811 Stock patterns

Available in 7 standard diamond and square designs, stock wood patterns are for use on foot treads, strip plates, thresholds, or any place where a safety surface is desired. Size is 12 in. by 8 ft. *Rock River Lumber Co.*

### 812 Non-ferrous furnace

Melting furnaces are designed for high capacity, rapid melting of all non-ferrous metals. They are available for oil or gas,



and with tilting or stationary crucibles. Tilting types lock in any position. A simple cover-lifting mechanism is operated from the front. There is a manual control of air and gas, using single valves. *Johnston Mfg. Co.*

## *coming events*

### August

**16 . . Western Michigan**
Pontaluna Golf Club. Picnic.

### September

**5 . . Cornbelt Chapter**
Castle Hotel. A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee. *"Coordinative Function of Pattern Equipment and Castings."*

**6 . . Tennessee Chapter**
Camp Columbus, Chickamauga Lake. Barbecue.

**6 . . Central Indiana**
Lake Shore Country Club, Indianapolis, Ind. Picnic and Golf Outing.

**8-10 . . American Standards Association**
Museum of Science & Industry, Chicago. National Standardization Conference.

**8-12 . . Instrument Society of America**
Annual Meeting, Cleveland.

**8-13 . . Molding Materials Program**
Sponsored by the Massachusetts Institute of Technology, Cambridge, Mass. *"Chemistry and Mechanics of Molding Materials."*

**11 . . St. Louis**
York Hotel. Marion Allen, American Steel Foundries Co., president, Foundry Education Foundation.

**12 . . Southern California**
Rodger Young Auditorium, Los Angeles. S. C. Massari, A.F.S. National Office. *"Effect of Gating Design on Casting Quality."*

**12-13 . . Ontario**
Fern Cottage, Orillia. Annual picnic.

**13 . . Michiana**
Plymouth Country Club, Plymouth, Indiana. Annual picnic.

**17 . . Mo-Kan**
Fairfax Airport. A. F. Pfeiffer, Allis-Chalmers Mfg. Co., Milwaukee. *"Pattern Equipment & Castings."*

**18 . . Washington**
Stewart Hotel, Seattle. A.F.S. Film: *"Effect of Gating Design on Casting Quality."*

**18-19 . . National Foundry Association**
Edgewater Beach Hotel, Chicago. Annual Meeting.

**19 . . Texas**
Houston. Dinner and film. *"Effect of Gating Design on Casting Quality."*

**22-23 . . Steel Founders' Society**
Homestead, Hot Springs, Va. Fall Meet.

**25-27 . . Verein Deutscher Giessereifachleute**
General Meeting and Foundrymen's Convention. Robert Schumann Hall, Düsseldorf, Germany.

**26-27 . . Ohio Regional Foundry Conference**
Ohio State University, Columbus, Ohio. Sponsored by A.F.S. Canton District, Central Ohio, Cincinnati District, Northeastern Ohio and Toledo Chapters and Ohio State Student Chapter.

**30-October 3 . . Iron & Steel Exposition**
Public Auditorium, Cleveland. Association of Iron and Steel Engineers.

### October

**16-17 . . Gray Iron Founders' Society**
Hotel Cleveland, Cleveland. Annual Meet.

**16-18 . . Foundry Equipment Manufacturer's Association**
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.

**17 . . Texas**
Marshall. Dinner. M. L. Young, U. S. Gypsum Co., Chicago. *"Use of Gypsum Plaster in Pattern Making."*

**17-18 . . Michigan Regional Foundry Conference**
University of Michigan, Ann Arbor. Sponsored by A.F.S. Central Michigan, Western Michigan, Detroit and Saginaw Valley Chapters and A.F.S. Michigan State and U. of Michigan Student Chapters.

**20-24 . . American Society for Metals**
Philadelphia National Metal Congress and Exposition.

**22 . . Mo-Kan**
Fairfax Airport. Martin Fladoes, Sivyer Steel Casting Co., Milwaukee. *"Steel Casting Defects."*

## ▸ *Foundry bard rams up, pours poems*

■ Son of a molder, grandson of a patternmaker, and a foundryman himself, Bill Walkins, foundry bard of Electric Steel Foundry Co., Portland, Ore., knows what he's talking about when he puts foundry incidents—real and fancied—into verse.

One of the greatest fallacies of modern times is that modern methods and mechanization have destroyed the glamour, removed the romance from the foundry business, writes Bill in the preface of his book *Rammed Up and Poured.* Some operations are performed in the same manner as they were a hundred year ago; mechanization has a spectacular glamour of its own, he declares.

Bill sees the glamour of the foundry industry and describes it so well you can almost smell the tang of core gas, and hear the ribald suggestions to the pourer who carelessly misses the pouring cup. Arrangements have been made through the cooperation of Bill and his company for AMERICAN FOUNDRYMAN readers to enjoy the poems which have delighted readers of *The ESCO Ladle,* Electric Steel monthly publication, for over five years. The company thought so much of Bill's poems it had them printed and copyrighted in an illustrated book which has been distributed to all Electric Steel employees.

Now a sand mill operator at Electric Steel, Bill has worked in other shops as molder, coremaker, and practically every other job. Born in Marion, Ohio, July 10, 1914, he says he walked in the front door and out the back at Ohio Northern University so he could say he went through college. In addition to working as a foundryman, he has been assistant theatre manager, a small town newspaper reporter, school teacher, band organizer, and camp newspaper publisher in a CCC camp, a night club MC and entertainer, and an itinerant workman.

The first of Bill Walkins' poems from *Rammed Up and Poured* appears in this issue. Others will follow.

### Soul moulding

The molder's skill is needed when at last the mold is rammed.
When cope is lifted, pattern drawn, he shapes the pliant sand
With trowel and slick and lifter; deftly moves a skillful hand
To make it match the pattern as closely as he can.

**Bill Walkins, foundry bard, jots down poetic thoughts between sand mixes. Photo is by A. B. Jackson, Ill. Electric Steel Foundry Co., Portland, Ore.**

With greatest care he sets his cores; not in the least annoyed
In knowing that his handiwork is soon to be destroyed.
A mold is slicked and washed and cored and closed and clamped—and then
They pour it full of molten steel and shake it out again.

But every foundry workman knows that sand molds are not lasting
But only made to realize the end result —the casting.
Yet cores and molds must all be shaped with utmost care, we've found
In order that the casting may be good and true and sound.

You cynics and you skeptics who would have us wonder why
Our lives should be impeccable—ideals and morals high;
"Why not live gaily, fast and free! Why not take wings and fly?
For life's at best elusive, fleeting—in the end we die!"

Nay! Life is like the founder's mold, shaped in timeless sand.
And like the mold, it should be formed with careful, skillful hand.
This temporary, sand-mold life assures the ultimate goal
And must conform to pattern for the casting of the soul.

### ▸ *Society of German Foundrymen to hold annual meeting*

■ General meeting and convention of Verein Deutscher Giesserifachleute will be held September 25-27 in Dusseldorf, Germany, according to Dr. Erich Hugo, secretary of the organization. During the three days technical papers will be presented, business committee meetings will be held, and visits to industrial plants will be made. The second day will be devoted to technical sessions, all of which are to be held in Robert Schumann Hall.

## foundrymen

*continued from page 30*

industry by forming the Newbury Mfg. Co., Monroe, Ala., with his brother. In 1932 he moved to Talladega and founded a similar business, and although he retired in 1947 the foundry is being continued under the Newbury name. He was a member of the Birmingham District Chapter of A.F.S.

**Frank J. Ring,** vice-president of A. Kilpatrick Sons Foundry Co., St. Louis, Mo., died Sunday, April 13.

**Ingwald M. Larson,** 67, died suddenly July 9 while on vacation. Prominent in the metals industry, Mr. Larson had been associated with Claud S. Gordon Co., Chicago, for nearly 25 years and was secretary of the firm at time of his death.

**Arthur E. McClintock,** 77, retired commissioner of the National Foundry Association, died at his home in Oak Park, Ill., July 18. He drafted his own obituary which continues in part as follows:

"Following his graduation from Albion College in 1898, he entered the employ of the National Foundry Association at Detroit, just a few months after the association was organized. In 1906 he established a branch office in Chicago and served as assistant commissioner until 1910 when he was elected to the chief staff position. He held this position until he retired in 1945."

**Harry E. Lees,** 62, divisional superintendent of Whitin Machine Works, Whitinsville, Mass., died in Whitinsville Hospital May 29. He had been in failing health for the preceding few weeks. Vice-chairman of the A.F.S. Pattern Division, he was also a board member of the Pattern Makers' Association of America. Mr. Lees was born in Oldham, England, coming to America over 40 years ago. He entered Whitin Machine Works as a wood pattern maker, later becoming foreman, and finally divisional superintendent.

### ▶ *Sand and metal control tools described in book*

■ *"Tools for Control"*, 94-page book describing and illustrating sand and metal testing equipment covers a wide variety of laboratory and shop equipment for foundry use. How equipment is used, kept in good working order, and checked for reproducibility of results, is covered. Back section of book includes technical data, illustrations of casting defects due to sand, a casting quality chart, and a casting finish control plan.

*"Tools for Control"* is available free on request made on company letter head. Write to: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich.

# foundry tradenews

**Cooper Alloy Foundry Co.,** Hillside, N. J., has obtained a Mutual Security Agency guaranty of currency convertibility covering royalty payments by A.P.V. Co., of London for the use of Cooper processes. The British firm will use the Cooper processes and technical data to manufacture stainless steel valves. MSA has agreed to convert into dollars any sterling royalty payments which the American firm is unable to convert through regular foreign exchange channels, up to a maximum of $153,500 over a 10 year period.

**International Organization for Standardization** has announced that agreement on six methods of testing steel and steel castings has been reached by a 13-nation technical committee which met at Columbia University recently. Test methods agreed on by the committee are the Rockwell, Brinell, and Vickers (diamond pyramid) tests for hardness, the Bend test, and the Izod and Charpy impact tests.

**Vonnegut Moulder Corp.,** Indianapolis, was taken over by its personnel following the retirement of Anton Vonnegut. Officers of the newly formed corporation, to be called the Grinding & Polishing Machinery Corp., are: R. W. Smart, president; O. S. DeHaven, vice-president; and I. W. Bosworth, secretary and treasurer. Mr. Vonnegut will serve as a member of the board of directors. The new corporation will continue to manufacture and distribute all products of Vonnegut Moulder Corp.

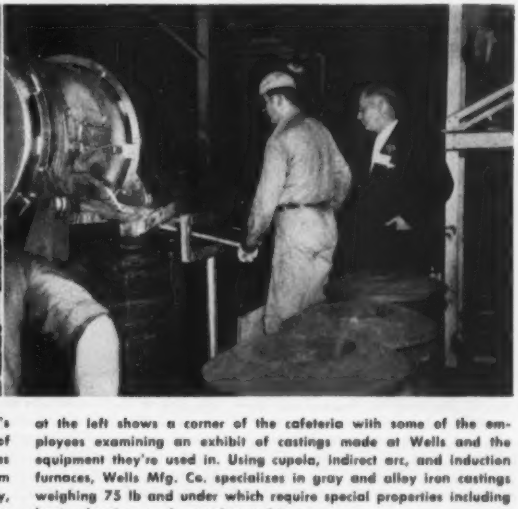
**Foundry Services (Canada) Ltd.,** Toronto, has announced its new factory in Guelph, Ontario, is nearing completion and is expected to commence full scale production of a range of company products this summer in conjunction with a completely equipped metallurgical laboratory which will form the basis for free technical advisory functions which are an essential part of Foseco service. Completion of the new foundry will put an "All Canadian" stamp upon the company's future output and effort, and eliminates dependency upon the British parent company for imports and service.

**Speer Carbon Co.,** Saint Marys, Pa., and its subsidiaries, Jeffers Electronics, Inc. Dubois, Pa.; International Graphite & Electrode Corp., Niagara Falls; and Speer Resistor Corp., Saint Marys, Pa., have merged. The consolidation, to be known as Speer Carbon Co., will have headquarters at Saint Marys and the various subsidiaries will operate as divisions.

**International Minerals & Chemical Corp.,** Chicago, opened its new million dollar research laboratory in Skokie, Ill., June 27. The new, modern, fireproof laboratory will house approximately 75 scientists and technicians working on the broader research projects of the corporation, according to Louis Ware, president. According to Dr. Paul D. V. Manning, vice-president in charge of research and development, specialized research will continue at various other laboratories of the corporation. The new laboratory will make available to Eastern Clay Products Dept., facilities for basic and fundamental research in foundry materials. Fundamental research activities carried on centrally will be supplemented through studies in specific fields by commercial laboratories. Cited as examples by Norman J. Dunbeck, vice president of the corporation's Industrial Minerals Div., are the continuation of applied research in bentonites, other clays, and refractories in professional foundry sand and metals casting laboratories.

**H. K. Ferguson Co.,** Cleveland, industrial engineers and builders, has announced the purchase of all process and patent rights covering the Elliott Oxygen System for production of tonnage oxygen and high purity nitrogen and availability of complete plants of this type on a turn-key contract basis. Dr. Irving Roberts, who participated in development of the Elliott System, has been retained by Ferguson to offer technical assistance and consultation to interested companies.

**Lindberg Engineering Co.,** Chicago, manufacturers of industrial products and heating equipment, announced the opening of plant number 2. The additional 6200 sq ft of production space enable the company to attack a backlog created during the past 6 months. The new plant will manufacture smaller

Open house at Wells Mfg. Co., Skokie, Ill., showed off the company's new offices and laboratories and expanded foundry, culmination of a 5-yr building program. During the period tonnage poured has risen from 12 to 50 a day while employees have increased from 60 to 225. At the right is M. K. Wells, president of the company, watching the pouring of stack molds directly from a furnace. Scene at the left shows a corner of the cafeteria with some of the employees examining an exhibit of castings made at Wells and the equipment they're used in. Using cupola, indirect arc, and induction furnaces, Wells Mfg. Co. specializes in gray and alloy iron castings weighing 75 lb and under which require special properties including heat, abrasion, and corrosion resistance.

## *tradenews*

*continued from preceding page*

units, thereby, permitting the main plant to speed up production of large industrial heat treating furnaces.

**Michigan Oven Co.,** Detroit, to facilitate handling of increased business has moved its offices to new and larger quarters. The new offices occupy the entire sixth floor of the Architects Building, 415 Brainard St.

**Croydon Bells Inc.** has opened an office in Kalamazoo, Mich., to represent Gillett and Johnston, English bell founders located in Croydon, England, since 1844.

**Hills-McCanna Co.,** Chicago, closed its magnesium foundry for two weeks in July to permit installation of new major equipment. The remodeling, which adds 35,000 sq ft of production area, is part of the company's foundry expansion program and makes it one of the larger foundries producing magnesium alloy sand castings.

**Howard Foundry Co.,** Chicago, which recently purchased the investment casting division of Allis-Chalmers Manufacturing Co., will continue to operate in the Allis-Chalmers leased plant at Milwaukee until permanent headquarters and facilities can be obtained. All key personnel associated with the former company were retained.

**Chrysler Corp.,** has plans in the engineering stages for a large aluminum foundry at its Michoud Ordnance plant, New Orleans. The foundry when completed will employ about 1000 skilled workmen to produce aluminum cylinder heads for 12-cylinder air-cooled tank engines. It will have a capacity of pouring more than 3,000,000 lb of aluminum a month and use about 400 tons of sand daily. Scrap metal from the foundry will be reclaimed by special furnaces with a capacity of 25,000 lb every eight hours. The cylinder head casting will be produced in an assembly of six cores. Aluminum for the foundry will be mainly supplied from the **Kaiser Aluminum Chemical** plant in Chalmette, La.

**American Brake Shoe Company's** mobile X-ray unit for employees—one of the first such units in industry—completed its first 50,000 miles of travel recently. The mobile unit, an important part of Brake Shoe's employee health program, is on the road constantly, making the circuit annually of the company's 54 plants throughout the country. Two hundred pictures can be taken in a normal day, enabling Brake Shoe to achieve its ultimate aim—100 per cent coverage of employees in each plant once a year.

**Gray Iron Research Institute, Inc.,** has moved to larger quarters at 870 W. Third Ave., Columbus 8, Ohio. Former location was 1300 Grandview Ave. The institute is a group of nearly 20 foundries which pool their knowledge and shop experience and sponsor a basic research program, according to Daniel E. Krause, executive director.

**National Motor Castings Div.,** Campbell, Wyant & Cannon Co., South Haven, Mich., was presented its second, annual National Foundry Safety Award plaque. The award was won by a 3.1 frequency average with only one lost time accident in the 1951-52 yearly period.

**Tennessee Products & Chemical Corp.,** Nashville, Tenn., at a recent meeting of the board of directors reviewed a plan submitted by Carl McFarlin, president, for the establishment of a college scholarship fund for employees' children. Under the plan five scholarships will be awarded each year to deserving high school graduates—sons and daughters of Tennessee Products employees.

**Part of experimental foundry bay along east side of General Motors Research Laboratories metallurgy department building. Well ventilated, with acoustically-treated ceilings to reduce noise, the new building is 320 ft long, 110 ft wide, 36 ft high. It is outfitted with the most up-to-date laboratory and testing equipment available for metallurgical research. Pilot plant areas provide experimental production operations. Facilities include sand and metal control laboratories, x-ray room, wear and corrosion laboratory, metallography room, powder metallurgy equipment, creep and fatigue laboratory, and 15 furnaces.**

**U. S. Steel** plans to rebuild a battery of 45 coke ovens at the Cleveland Coke Works of American Steel & Wire. The installation is to feature a new collecting main; smoke which develops at the time when a coke oven is charged will be sucked into this main by special aspirators.

**International Harvester Co.,** Chicago, has formally opened its new central education and training building at 190 E. Delaware Pl. Built and equipped at a cost of $600,000 the five story building provides the company with ample facilities to which it brings managerial employees from plants and sales offices throughout the country for technical training and also to broaden their general education. The school's permanent staff of 11 is augmented by rotating instructors from Harvester operations throughout the country and guest instructors.

**Caterpillar Tractor's** Peoria (Ill.) research department has revealed that contrary to popular opinion, the Russians have a very keen knowledge of engineering and mechanics. This was disclosed after detailed examinations of two well-built Red tractors, the Stalinetz 80. The tractors were found to be copies of Caterpillar's D7, but had been redesigned to fit more convenient metric dimensions—no mean engineering feat. Caterpillar's research director said they are well engineered, well manufactured copies, reflecting Russian practices, Russian machine tools and the raw materials available. Caterpillar engineers are of the opinion that the illegitimate cousin of their D7, Caterpillar's second largest track-type tractor, was copied from machines obtained by Russia under Lend Lease about 10 years ago.

**Westinghouse Electric Corp's.** Sturtevant Div., Pittsburgh, has expanded its air handling department. Eight new regions have been created and eight regional managers have been appointed to supervise the application of air handling apparatus in their respective areas.

**E. J. Woodison Co.,** Buffalo, N. Y., has installed new equipment that will triple the production capacity of its products.

**Carborundum Company's Coated Products Div.,** Niagara Falls, has a new production technique for controlling thickness and density of adhesive abrasive, and final adhesive coat within one per cent accuracy. Five gages continuously assess weight after final adhesive application on lines traveling to 350 fpm.

**Eaton Manufacturing Company's** *Eaton News* has been honored by the Freedoms Foundation for outstanding

achievement in bringing about a better understanding of the American way of life. The company's Foundry Div., Vassar, Mich., recently awarded pins to veteran workmen including five with 20 years of service. Presentations were by Ernest L. Waterhouse, plant manager.

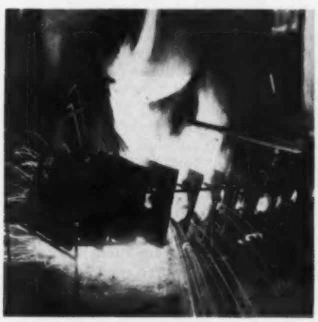
**Federal Foundry Supply Co.,** Cleveland, was awarded a plaque by *Design News* for "excellence in general mechanical design" of the company's new core blower. An article describing the design features of the blower which the magazine had published led to the award.

**Wark Foundry Equipment Co.,** Buffalo, N. Y., has been adopted by Wark Foundry Services as the company's new name.

**Stockham Valves & Fittings, Inc.,** Birmingham, Ala., which bought Wedgeplug Valve Co. of New Orleans will continue to operate the holding as a separate corporation. Wedgeplug produces valves for the oil industry.

**Wheelco Instruments Div.,** Barber-Colman Co. has transferred manufacturing and operating facilities from Chicago to Rockford, Ill. No change has been made in Wheelco district offices.

**Apex Smelting Co.,** with plants in Chicago and in Cleveland, is constructing a commercial pilot plant in Los Angeles. Using clays as raw material, the plant will produce intermediate alloys containing aluminum and silicon. The alloys produced will be used by the company and also will be available to other metal users. Dwight L. Palmer, assistant vice president and Cleveland works manager has been promoted to vice president and Los Angeles works manager.



**Pouring stainless steel into shell molds held in frame without backing material. Scene was photographed during the shell molding open house of Cooper Alloy Foundry Co., Hillsdale, N. J., June 20. The company's shell mold department includes a heavy-duty mold making machine which turns out a complete mold every 2½ min. For other illustrations of Cooper Alloy shell mold operations see Modern Foundry Methods on page 42.**

## letters

*continued from page 69*

contained in the definition of synthetic sand mixtures. In the FOUNDRY SAND TESTING HANDBOOK we find the following: Synthetic sand—"any sand mixture compounded from selected materials which when mixed together produce a mixture of the proper physical and mechanical properties from which to make foundry molds."

The definition clearly states these mixtures are compounded. The term compounded is used by the pharmacist in making up prescriptions. We would hardly wish the pharmacist to synthesize a prescription.

SYNTHETIC NOT JUSTIFIED

An examination of the possible components of a compounded sand mixture indicates there is little justification for the use of the term synthetic as against compounded. The four important components are as follows, along with the more usual materials available for use:

Sand-grains—quartz, zircon, coke, olivine, etc.

Clay-materials—kaolinite, montmorillonite, illite.

Additives—silica flour, sea coal, wood flour, etc.

Organic materials (bonding)—oils, starches, resins, caseins, etc.

Sand mixtures are compounded from the above materials, none of which is synthetic. It is therefore suggested that the foundry industry adopt the more justified nomenclature for its man-made sand mixtures. It is true that the term synthetic has been in use for a quarter of a century but that is hardly an adequate reason for maintaining its use if a more appropriate word is available.

The definition quoted indicates that compounded sand mixtures are used only for production of molding sand mixtures. By referring to the components possible in these mixtures one can easily see that core sand mixtures are compounded sand mixtures. For example, a simple core sand mixture is compounded from sand grains and one of the organic bonding materials. It is therefore further suggested that the definition of compounded sand mixtures be expanded to close—"from which to make foundry sand molds and cores."

According to the definition for compounded sand mixtures we can include a naturally-bonded sand mixed with sea soal. There is nothing semi-synthetic about this mixture.

To further indicate compounded sand mixtures are not synthetic, consider the components of naturally bonded sand mixtures: sand grains—quartz; clay-mineral—kaolinite; silt—chiefly fine quartz particles; organic material—roots, decayed vegetation. The silt is comparable to the additives in that neither provides significant bonding of the sand grains. There is nothing syn-

thetic about the above components which nature has compounded for us.

CONCLUSIONS

1. The term compounded more adequately expresses man-made mixtures.
2. The definition for compounded sand mixtures is applicable to core sand mixtures as well as molding mixtures.
3. Mechanical rather than physical more adequately represents the type of property used to evaluate compounded sand mixtures.
4. Clarification by points listed above will provide a clearer understanding of what is happening when producing a compounded sand mixture.

DOUGLAS C. WILLIAMS, *Assoc. Prof.*
Industrial Engineering Dept.
Ohio State University

### ▶ *British report ventilating, heating, lighting advances*

■ Six technical papers on foundry health and safety problems make up the latest issue of the *Journal of Research and Development* (vol. 4, no. 4) of the British Cast Iron Research Association. The papers were presented at a BCIRA conference on heating, ventilation, and lighting. Published in their entirety along with discussions, the papers are entitled: *"Fans—Their Characteristics and Factors Governing their Selection," "Dust in Foundries," "Fume and Dust Extraction at the Knock-out," "Heating in Foundries," "Core Removal and Cleaning of Castings by the Wet Process,"* and *"Some Experiences with Cupola Spark and Dust Arresters."*

### ▶ *Foundry dust, fume control shown in new motion picture*

■ *"The Invisible Shield,"* sound-color motion picture film, illustrates and explains dust and fume control in modern foundry operations, and building ventilation balance. Shown in the 23-minute, 16-mm movie are all operations from raw materials handling to inspection and shipping. Available for showing at no cost, *"The Invisible Shield"* can be obtained from Claude B. Schneible Co., Box 81, North End Station, Detroit 2, Mich. Company pays shipping charges.

### ▶ *Evening foundry course starts at New York trade school*

■ Foundry training course will be offered two nights a week starting in September at the Machine & Metal Evening Trade School, New York. Tuition-free, the course starts with registration at the school the evenings of September 8 and 9. Classes are scheduled from 7:00 p.m. to 9:00 p.m. on Mondays and Wednesdays.

The school, open to all interested in obtaining a practical knowledge of the foundry, will cover iron, bronze, and aluminum. Machine & Metal Evening Trade School is at 321 East 96th St., New York.

## *index to* Advertisers

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We are looking for a technically trained man, preferably with some chemical training. Applicant should be familiar with foundry practices and methods. The man we are seeking will do considerable traveling calling on foundries in a technical sales capacity for a large resin manufacturer. Location—Midwest.

**Metallurgist**

For gray iron foundry producing heavy castings in high strength and alloyed irons. Must have thorough knowledge of cupola practice and metallurgical controls. Kindly address replies to:

**Harold Lowe**
**Buflovak Equipment Div.**
**Blaw-Knox Co. Buffalo, N. Y.**

**HW 602 . . Superintendent**

Opportunity for well qualified, experienced superintendent of non-ferrous foundry employing 100 to 150. Applicant should be between 35 and 45 years of age. Enclose photograph and state complete record of education and experience in detail including previous employment and length of service.

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